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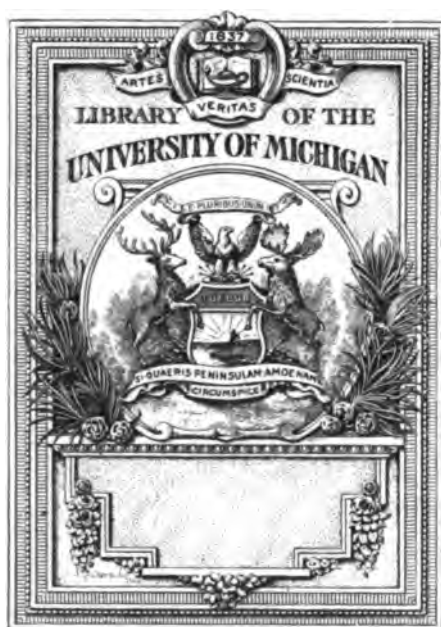
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OF THE

American Geographical Society

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ALBANY, N. Y.

STATE OF NEW YORK

No. 99.

IN SENATE,

April 9th, 1874.

ANNUAL REPORT

OF THE

AMERICAN GEOGRAPHICAL SOCIETY OF NEW YORK

For the Year 1873.

AMERICAN GEOGRAPHICAL SOCIETY,
COOPER INSTITUTE,
NEW YORK, April 7th, 1874. }

Hon. JOHN C. ROBINSON,

President of the Senate of the State of New York:

SIR,—In conformity with the provisions of the act incorporating this Society, I have the honor to transmit herewith the annual report of the American Geographical Society for the year 1873.

Very respectfully yours,

ALVAN S. SOUTHWORTH,

Recording Secretary.



AMERICAN GEOGRAPHICAL SOCIETY.

OFFICERS AND COUNCIL, 1878.

PRESIDENT:

CHARLES P. DALY, LL.D.

VICE-PRESIDENTS:

F. A. CONKLING, FRANCIS A. STOUT, T. BAILEY MYERS.

FOREIGN CORRESPONDING SECRETARY:

JAMES MÜHLENBERG BAILEY.

DOMESTIC CORRESPONDING SECRETARY:

W. H. H. MOORE.

RECORDING SECRETARY:

E. R. STRAZNICKY, M. D., PH. D.

GENERAL SECRETARY:

ALVAN S. SOUTHWORTH.

TREASURER:

HENRY CLEWS.

COUNCIL:

WILLIAM REMSEN,	GEORGE W. CULLUM, U. S. A.
W. TILDEN BLODGETT,	GEORGE CABOT WARD,
WILLIAM E. CURTIS,	ELIAL F. HALL,
THEODORE W. DWIGHT, LL. D.,	THEODORE ROOSEVELT,
WILLIAM JONES HOPPIN.	



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REPORT

THE

GEOGRAPHICAL SOCIETY.

Presented to the Legislature of the State of New York:

In presenting the annual report of the Society as required by the act of April 8th, 1871, we beg leave to say, that the charter, amended charter, organization, and general business, embracing a complete history of the Society's operations during 1873, will be found in the following pages. The papers which have been read before it have been important contributions to geographical knowledge, some of them of vital interest to the commerce and prosperity of the State of New York. At no time in its history has the Society enjoyed greater prosperity, or a more enthusiastic support from scientific societies, the army and navy, civilian travellers, and the public throughout the Union.

Respectfully submitted,

CHARLES P. DALY,

President.

ALVAN S. SOUTHWORTH,

Recording Secretary.

CHARTER OF INCORPORATION.

GRANTED APRIL 18TH, 1854.

The People of the State of New York, represented in Senate and Assembly, do enact as follows :

SECTION 1. George Bancroft, Henry Grinnell, Francis L. Hawks, John C. Zimmerman, Archibald Russell, Joshua Leavitt, William C. H. Waddell, Ridley Watts, S. De Witt Bloodgood, M. Dudley Bean, Hiram Barney, Alexander J. Cotheal, Luther B. Wyman, John Jay, J. Calvin Smith, Henry V. Poor, Cambridge Livingston, Edmund Blunt, Alexander W. Bradford, and their associates, who are now or may become hereafter associated for the purposes of this act, are hereby constituted a body corporate by the name of The American Geographical and Statistical Society, for the purpose of collecting and diffusing geographical and statistical information.

§ 2. For the purposes aforesaid, the said Society shall possess the general powers and privileges, and be subject to the general liabilities, contained in the third title of the eighteenth chapter of the first part of the Revised Statutes, so far as the same may be applicable, and may not have been modified or repealed ; but the real and personal estate which the said Society shall be authorized to take, hold, and convey, over and above its library, and maps, charts, instruments, and collections, shall not at any time exceed an amount the clear yearly income of which shall be ten thousand dollars.

§ 3. The officers of the said Society shall be a president, three vice-presidents, a corresponding secretary, a recording secretary, a librarian, and treasurer, and such other officers as may from time to time be provided for by the by-laws of the said Society.

§ 4. The said Society, for fixing the terms of admission of its members, for the government of the same, for changing and altering the officers above named, and for the general regulation and management of its transactions and affairs, shall have power to form a code of by-laws, not inconsistent with the laws of this State, or

of the United States; which code, when formed and adopted at a regular meeting, shall, until modified or rescinded, be equally binding as this act upon the said Society, its officers, and its members.

§ 5. The Legislature may at any time alter or repeal this act.

§ 6. This act to take effect immediately.

STATE OF NEW YORK, }
Secretary's Office, } ss.

I have compared the preceding with the original law on file in this office, and hereby certify the same to be a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this
[L. s.] thirteenth day of April, one thousand eight hundred and fifty-four.

A. G. JOHNSON.

Deputy Secretary of State.

AMENDED CHARTER.

PASSED APRIL 8TH, 1871.

STATE OF NEW YORK, No. 237, IN SENATE, *March 7th*, 1871. — Introduced, with unanimous consent, by Mr. Bradley; read twice, and referred to the Committee on Literature; reported favorably from said committee, and committed to the Committee of the Whole.

CHAP. 373.

AN ACT in relation to The American Geographical and Statistical Society.

PASSED April 8th, 1871.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The name or corporate title of the said Society shall hereafter be, The American Geographical Society of New York.

§ 2. The objects of the said Society shall be the advancement of geographical science; the collection, classification, and scientific arrangement of statistics, and their results; the encouragement of explorations for the more thorough knowledge of all parts of the North-American continent, and of other parts of the world which may be imperfectly known; the collection and diffusion of geographical, statistical, and scientific knowledge, by lectures, printed publications, or other means; the keeping-up of a correspondence with scientific and learned societies in every part of the world, for the collection and diffusion of information, and the interchange of books, charts, maps, public reports, documents, and valuable publications; the permanent establishment in the city of New York of an institution in which shall be collected, classified, and arranged, geographical and scientific works, voyages and travels, maps, charts, globes, instruments, documents, manuscripts, prints, engravings, or whatever else may be useful or necessary for supplying full, accurate, and reliable information in respect to every part of the globe, or explanatory of its geography, physical and descriptive; and its geological history, giving its climatology, its productions, animal, vegetable, and mineral; its exploration, navigation, and commerce;

having especial reference to that kind of information which should be collected, preserved, and be at all times accessible for public uses in a great maritime and commercial city.

§ 3. The power given by the act hereby accorded to the said Society, to take, hold, convey, manage, and make use of its real and personal estate, shall be understood as authorizing said Society to take and hold by gift, grant, bequest, devise, subject to all provisions of law relative to devises and bequests by last will and testament, or purchase real estate to the value of three hundred thousand dollars, and to invest its income or its personal estate generally so as to produce a regular annual income sufficient for the accomplishment of the purposes set forth in the first section of this act; but said annual income shall not exceed twenty-five thousand dollars annually.

§ 4. The said Society shall make an annual report of its proceedings to the Legislature.

STATE OF NEW YORK, }
Office of Secretary of State, } ss.

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this
[L. s.] twenty-second day of May, in the year one thousand eight hundred
and seventy-one.

DIEDRICH WILLERS, JR.,

Deputy Secretary of State.

BY-LAWS.

REVISED JANUARY 19TH, 1874.

CHAPTER I.

TITLE.

The title of the Society is "The American Geographical Society."

CHAPTER II.

OBJECTS.

The objects of the Society are "the collecting and diffusing of geographical and statistical information".

CHAPTER III.

MEMBERS.

1. The Society shall consist of Fellows; honorary, corresponding, and ex-officio members.
2. Honorary members shall be chosen on account of their distinction in the science of geography or statistics, and not more than twelve of them shall hereafter be elected in any one year.
3. Corresponding members shall be chosen from those who have aided the advancement of geography or statistics.
4. Ex-officio members shall be foreign diplomatic representatives and consuls, resident in the United States; and United States diplomatic representatives and consuls in foreign countries.
5. Fellows, and corresponding and honorary members, shall be elected as follows: All nominations of candidates shall be openly made in writing at a meeting of the Society, or the Council, by a

member thereof, and, together with the name of the member making them, entered on the minutes. The persons thus nominated, when approved by the Council and elected by the Society, shall, on payment of the initiation-fee, if nominated as Fellows, and without such payment if nominated as corresponding or honorary members, become members of the Society accordingly.

6. Persons entitled to become ex-officio members of the Society shall, on the recommendation of the Council, be, by the Society, constituted and declared to be such members.

7. The name of any member of the Society may, on the recommendation of the Council, and by a vote of two-thirds of the members present at a stated meeting of the Society, be dropped from the roll of its members.

CHAPTER IV.

INITIATION-FEE AND ANNUAL DUES.

1. The initiation-fee, including the dues for the current year, shall be, for a Fellow, ten dollars, to be paid immediately on election.

2. The annual dues thereafter shall be, for a Fellow, five dollars, to be paid in advance.

3. Any Fellow of the Society not in arrears may commute for life all dues for Fellowship by the payment at one time, if a Fellow, of one hundred dollars.

4. The name of any Fellow of the Society neglecting for two successive years to pay his annual dues, or at any time wholly refusing to pay them, may, by the Council, be erased from the list of Fellows of the Society.

5. The fiscal year of the Society shall, for all purposes, be the calendar year; that is, commence on the first day of January, and end with the thirty-first day of December, in each year.

CHAPTER V.

OFFICERS.

1. The officers of the Society shall be a president, three vice-presidents, a foreign corresponding secretary, a domestic corresponding secretary, a recording secretary, treasurer, and fifteen

councillors; and these officers, together, shall form the Council of the Society.

2. The officers of the Society shall be chosen from among its members; they shall be elected annually by ballot, and shall hold their offices respectively until others are elected in their places.

3. All officers of the Society, to be chosen at any election, may be voted for on one ballot.

CHAPTER VI.

ANNUAL MEETING.

1. The annual meeting of the Society shall be held on the second Tuesday after the first day of January in each year, and every year hereafter, when the annual election of the officers of the Society shall take place; and if, from any cause, there shall be a failure of the annual election at the time above designated for that purpose, the same may be held on the Tuesday next following; that is, on the third Tuesday after the first day of January in each year, and of which due notice shall be given.

2. Every member of the Society, who has been such for twenty days or more, and who is not in arrears for his dues for the past year, shall be entitled to vote at the said election.

3. At the annual meeting of the Society, the Council shall present a general report of its proceedings, and of those of the Society during the past year; and the Secretaries and Treasurer shall also present their annual reports.

CHAPTER VII.

MONTHLY AND SPECIAL MEETINGS.

1. The Society, unless otherwise specially ordered by the Society or the Council, shall hold its stated meetings for the transaction of business on the second Tuesday of each month of the year, except July, August, and September.

2. The President, or, in his absence, one of the Vice-Presidents, may, and, upon the written request of five members, shall, call a special meeting of the Society, by giving three days' notice thereof in two daily newspapers, published in the city of New York.

CHAPTER VIII.

ORDER OF BUSINESS.

1. At all stated meetings of the Society, for the transaction of ordinary business, the order of proceedings shall be as follows :

1. Reading of the minutes.
2. Reports and communications from officers of the Society.
3. Reports from the council.
4. Reports from committees.
5. Nominations of members.
6. Special orders.
7. Unfinished business.
8. Miscellaneous business.
9. Papers read and addresses delivered before the Society.

2. All propositions presented for the action of the Society, at any of its meetings, shall be in writing when requested by the presiding officer, or any member. A proposition thus presented, when seconded, and the question thereon stated from the chair, shall be deemed to be in the possession of the Society, and open for discussion, but may be withdrawn by the mover at any time before amendment or decision.

3. No member shall speak more than once upon the same question until all the other members present desiring to speak shall have spoken ; nor more than twice on any question without leave of the Society.

CHAPTER IX.

QUORUM.

At all meetings of the Society, nine members present shall constitute a quorum for the transaction of business.

CHAPTER X.

COMMITTEES.

All committees authorized by the Society shall, unless otherwise specially ordered, consist of three members each, and be appointed by the presiding officer.

CHAPTER XI.

PRESIDING OFFICER.

At all meetings of the Society, on the arrival of the appointed hour, and the presence of a quorum, the President, or, in his absence, one of the Vice-Presidents, or, in the absence of both, the Chairman *pro tem.*, shall immediately take the chair, call the meeting to order, and preside. He shall have only a casting vote. He shall preserve order and decide all questions of order, subject to an appeal to the Society. He shall also, unless otherwise specially ordered, appoint all committees authorized by the Society; and at every annual election, before the opening of the polls, he shall appoint two tellers of the election.

CHAPTER XII.

SECRETARIES.

1. Foreign Corresponding Secretary.—It shall be the duty of the Foreign Corresponding Secretary to conduct the general correspondence of the Society with individuals and associate bodies in foreign countries.

2. Domestic Corresponding Secretary.—It shall be the duty of the Domestic Corresponding Secretary to conduct the Society's general correspondence with individuals and associate bodies in the United States.

3. Both the Foreign and Domestic Secretaries shall keep, in suitable books to be provided for that purpose, at the Society's rooms, true copies of all letters written by them respectively on behalf of the Society; and shall preserve, on proper files, at the said rooms, all letters received by them on the same account; and at each stated meeting of the Society or the Council, they shall respectively report their correspondence, and read the same, or such parts thereof as may be required.

4. In case of a vacancy in the office of either of the Corresponding Secretaries, or in the absence or disability of either of these officers, the duties of both may be performed by the other Corresponding Secretary.

5. The Society may designate a particular officer, or appoint a committee, to prepare a letter or letters on any special occasion.

6. Recording Secretary.—It shall be the duty of the Recording Secretary to give due notice of the time and place of all meetings of the Society, and to attend the same. He shall keep fair and accurate minutes of the proceedings of the Society, and record the same, when approved, in the Society's Journal. He shall give immediate notice to the several officers and committees of the Society of all votes, orders, resolves, and proceedings of the Society affecting them, or appertaining to their respective duties. He shall prepare a list of the members of the Society entitled to vote, to be handed to the Tellers before the opening of the polls at each annual election. He shall officially sign and affix the corporate seal of the Society to all diplomas, and other instruments or documents authorized by the Society or Council. He shall have charge of the corporate seal, charter, by-laws, records, and general archives of the Society, except so far as they may be expressly placed under the charge of others. He shall certify all acts and proceedings of the Society, and shall notify the Council of the death, resignation, or removal of any officer or member of the Society. He shall have charge of the rooms of the Society, and shall perform all such other and further duties as may, from time to time, be devolved upon him by the Society or the Council. He shall receive, for his services, such salary or pecuniary compensation as shall be determined by the Society or the Council; but neither in the Society nor the Council shall he have a vote on any question relating to, or affecting, his salary or pecuniary compensation. He, together with the Council, shall have the charge and arrangement of the books, maps, and collections belonging to the Society. He shall cause to be kept in the rooms of the Society a registry of all donations to the library or collections of the Society, acknowledge their receipt by letter to the donors, and report the same, in writing, to the Society at its next stated meeting.

7. All documents relating to the Society, and under the charge of the Secretaries respectively, shall be placed in such depositories in the rooms of the Society as the Council may provide and designate for that purpose.

CHAPTER XIII.

TREASURER.

The Treasurer shall have charge of, and safely keep, all contracts, certificates of stock, securities, and muniments of title belonging to the Society. He shall collect the dues and keep the funds of the Society, and disburse the same under the direction of the Council; and so often as the said funds in the hands of the Treasurer shall amount to one hundred dollars he shall deposit the same, in the name of the Society, in some incorporated bank in the city of New York, to be designated for that purpose by the Council; and the said funds, thus deposited, shall be drawn out of the said bank on the check of the Treasurer, countersigned by the Chairman of the Council, and only for the legitimate and authorized purposes of the Society. The Treasurer shall, previous to the annual meeting of the Society, prepare and submit to the Council, for audit, a detailed account of his receipts and disbursements for account of the Society during the past year; which annual account, duly audited, he shall present, with his general report, to the Society, at its annual meeting.

CHAPTER XIV.

COUNCIL.

1. The Council shall have the management and control of the affairs, property, and funds of the Society; and shall designate an incorporated bank in the city of New York where the said funds shall, from time to time, as they accrue, be deposited by the Treasurer.

2. It may frame its own by-laws not inconsistent with the charter or by-laws of the Society.

3. It may, from time to time, determine the salary or pecuniary compensation of the Recording Secretary; and shall also appoint the necessary agents, clerks, and servants of the Society, with such powers, duties, privileges, and compensation as it may, from time to time, determine; and may, at pleasure, revoke such appointments, and make others in their stead.

4. It shall have power to fill, for the unexpired term, any vacancy that may occur in any of the offices of the Society.

5. It shall have power, at its discretion, to declare vacant the seat of any member of its own body (except the President and Vice-Presidents) who shall have been absent from its meetings for three successive months; and also, by a vote of a majority of the whole Council, to remove, from its own body, any member thereof for cause; but in such case it shall be the duty of the Council to report every such vacancy or removal to the Society, at its next stated meeting thereafter, when such cases shall be subject to review by the Society.

6. It shall not without an approving vote of the Society, at a stated meeting thereof, make any contract whereby a liability in amount above one thousand dollars may be incurred by the Society, nor, without such vote, make any sale or disposition of the property of the Society, exceeding that sum in value.

7. The Council may, in its discretion, remit the initiation-fee or annual dues of any member of the Society.

8. No member of the Council, except the Recording Secretary, shall receive any salary or pecuniary compensation for his services.

9. The Council shall hold stated meetings for the transaction of business, at least once in every month, except the months of July, August, and September.

10. At all meetings of the Council five members present shall constitute a quorum for the transaction of business.

CHAPTER XV.

GENERAL PROVISION AS TO DEBT.

No debt on account of the Society, beyond the funds in the treasury for its payment, shall, for any purpose, at any time, be incurred; and if, at any time, it shall appear that there are resting upon the Society pecuniary obligations beyond the funds in the treasury for their liquidation, no appropriation of funds from the treasury whatever, except for the necessary current expenses of the

Society, shall be made, until the said pecuniary obligations shall have been fully discharged, or the funds necessary for their extinction shall have been set apart for that purpose.

CHAPTER XVI.

ALTERATION OF THE BY-LAWS.

No alteration in the by-laws of the Society shall be made unless openly proposed at a stated meeting of the Society, entered on the minutes with the name of the member proposing the same, and adopted by the Society at a subsequent stated meeting by a vote of two-thirds of the members present.

CHAPTER XVII.

ADOPTION OF THE BY-LAWS.

The foregoing are hereby adopted and declared to be the by-laws of the Society; and all by-laws of the Society heretofore adopted are hereby rescinded, and declared to be null and void.

HONORARY, CORRESPONDING, RESIDENT AND NON-RESIDENT MEMBERS.

HONORARY MEMBERS.

BAKER, Sir SAMUEL WHITE, Pacha, F.R.S., London, England.
BAKER, Lady, London, England.
GRINNELL, HENRY, New York.
His Imperial Highness the Grand-Duke CONSTANTINE of Russia, President of the Imperial Geographical Society, St. Petersburg, Russia.
ISMAIL, H. I. H. Pacha, Khédive of Egypt.
LAYARD, AUSTIN HENRY, D. C. L., London, England.
MARKHAM, CLEMENTS R., C. B., Secretary of the Royal Geographical Society, London, England.
MCCLINTOCK, FRANCIS LEOPOLD, LL. D., London, England.
MIDDENDORFF, ADOLPH THEODOR VON, Secretary of the Imperial Academy of Sciences of Russia, St. Petersburg.
PETERMANN, Prof. AUGUSTUS, Ph. D., Gotha, Germany.
QUETELET, LAMBERT ADOLPHE JACQUES, President of the Central Commission of Statistics of Belgium, Brussels.
RAWLINSON, Sir HENRY CRESWICKE, D. C. L., London, England.
STRUVE, OTTO WILHELM VON, St. Petersburg, Russia.

CORRESPONDING MEMBERS.

ABBE, Prof. CLEVELAND, Cincinnati, Ohio.
ALVORD, Gen. BENJAMIN, U. S. A., Washington, D. C.
ALTAMIRANO, Señor Don IGNACIO, Mexico.
AMMEN, Com. DANIEL, U. S. N.
BAKER, Com. F. H., U. S. N., Norfolk, Va.
BARANDA, Señor JOAQUIN, Mexico.
BARCLAY, JAMES T., M. D., Jerusalem, Syria.
BARNARD, HENRY, LL. D., Hartford, Conn.
BARTLETT, JOHN RUSSELL, Providence, R. I.
BASTIAN, Dr. A., Berlin.

- BECKER, M. A., Vienna.
BEHM, Dr. E., Gotha.
BOUDINOT, Col. E. C., Venita, Cherokee Nation.
BRAINE, Com. D. L., U. S. N.
BRIGHT, JOHN, M. P., London, England.
BUSHNELL, ALBERT (Rev.), Gaboon, Equatorial Africa.
• CARLOS, Señor Don JOSÉ, Washington, D. C.
CHAIX, Prof. PAUL, Geneva, Switzerland.
CIEBOL, Señor MANUEL, Mexico.
CHAMBERS, WILLIAM, Edinburgh, Scotland.
CHANDLESS, W., F. R. G. S., London, England.
COLLINS, Lieut. FRED., U. S. N., Annapolis, Md.
DAVIS, THOMAS E., Rome.
DRAPER, LYMAN, Madison, Wis.
DUNCAN, WILLIAM H., Hanover, N. H.
EMORY, Gen. WILLIAM H., U. S. A., Washington, D. C.
FOETTERLE, FRANZ, late Secretary of the Imperial-Royal Geographical Society of Vienna, Austria.
GARDNER, J. T., Washington, D. C.
GIBBS, DOUGLASS, Alexandria, Egypt.
GILMAN, DANIEL COIT, LL. D., President University of California, Oakland.
GUYOT, Prof. ARNOLD HENRY, LL. D., Princeton, N. J.
HAGUE, J. D., Washington, D. C.
HANCOCK, WILLIAM NEILSON, LL. D., Dublin, Ireland.
HAYDEN, Prof. F. V., Washington, D. C.
HANSELL, Herr, Khartoum.
HELLWALD, FRIEDRICH VON, Member of the Imperial-Royal Geographical Society, Vienna, Austria.
HITCHCOCK, C. H., Ph. D., Hanover, N. H.
HOCHSTETTER, Dr. FERDINAND VON, Professor in the University of Vienna, Austria.
HOSMER, Dr. GEORGE W., London, England.
HOUGH, FRANKLIN B., M. D., Washington, D. C.
HUMPHREYS, Gen. A. A., U. S. A., Washington, D. C.
HUNT, Prof. T. STERRY, LL. D., Boston.
ISMAIL, Pacha, Governor-General of the Soudan.
JACKSON, JOHN P., Berlin.
KIRKHAM, Gen., Adowa, Abyssinia.
KING, CLARENCE, C. E., Washington, D. C.
LAPHAM, I. A., Milwaukee, Wis.
LAMANSKY, EUGENE VON, St. Petersburg, Russia.
LESSEPS, FERDINAND DE, Suez, Egypt.
LONG, STEPHEN H., Col. U. S. A., Louisville, Ky.

- LUCE, Capt. S. B., U. S. N.
 LULL, Com. E. P., U. S. N., Newport, R. I.
 MCCARTEE, DIVIE BETHUNE, M. D., Hong Kong, China.
 MCLEAN WILLIAM J., Bombay, India.
 MACLAY, WILLIAM W., U. S. N., Annapolis, Maryland.
 MALTE BRUN, V. A., Honorary Secretary of the Geographical Society,
 Paris, France.
 MARISCAL, Señor Don IGNACIO, Mexico.
 MARSH, Hon. GEORGE P., LL. D., U. S. Minister, Rome, Italy.
 MARTIN, Rev. WILLIAM A. P., D. D., Professor at the Imperial Col-
 lege, Pekin, China.
 MAUNOIR, CHARLES, Paris, France.
 MAURY, LOUIS FERDINAND ALFRED, Paris, France.
 NAPRSTEK, VOJTA, Prague, Austria.
 NASSAU, Rev. R. H., Gaboon, Africa.
 NEGRI, CHRISTOFORO, late President Italian Geographical Society,
 Consul-General of Italy, Hamburg.
 NEWMARCH, WILLIAM, Hon. Sec. of the Statistical Society of London,
 England.
 NORDENSKJÖLD, Prof. A. E., Stockholm.
 NYE, GIDEON, Canton, China.
 PALAZIOS, Gen. VICENTE RIVA, Mexico.
 PARDO, Señor Don EMILIO, Mexico.
 PAYNO, Señor Don MANUEL, Mexico.
 PERKINS, E. H.
 PENNA. Señor TERREIRA, Para, Brazil.
 PINHEIRO, J. C. FERNANDES, M. D., Brazil.
 PIMENTIL, Dr. JOAQUIN XAVIER DE OLIVEIRA, Santarem, Para, Brazil.
 POESCHE, THEODORE, Washington, D. C.
 RAE, JOHN, M. D., Hamilton, Canada,
 RIO DE LA LOZA, Señor Don LEOPOLDO, Mexico.
 ROBERTS, Gen. W. M., New York.
 ROMERO, MATHIAS, Mexico.
 ROGERS, Rear-Admiral JOHN, U. S. N.
 ROTHROCK, Dr. J. T., Wilkesbarre, Pa.
 SAINT-MARTIN, VIVIEN DE, Paris.
 SAUER, GEORGE, Paris.
 SAPUCACHY, M. le Viscomte, Rio Janeiro, Brazil.
 SCHADE, LOUIS, M. D., Washington, D. C.
 SCHLAGINTWEIT-SAKÜNLÜNSKI, ROBERT VON, Giessen, Germany.
 SCHLAGINTWEIT-SAKÜNLÜNSKI, HERMANN VON, Munich, Germany.
 SCHUMACHER, JOHN, Altona, Germany.
 SCHUYLER, EUGENE, St. Petersburg, Russia.
 SEYMOUR, HORATIO, LL. D., Utica, N. Y.

SIMMONS, D. B., M. D., Yeddo, Japan.
 STANLEY, HENRY M., Ashantee.
 STARRING, Gen. F. A., Paris.
 STEVENS, HENRY, London, England.
 STEERE, J. B., U. S. Consul, Hong Kong, China.
 TEJADA, DON SEBASTIAN LERDO DE, Mexico.
 VAN BENTHUYSEN, CHARLES, Albany, N. Y.
 WHEELER, Lieut. G. M., U. S. A., Washington, D. C.

RESIDENT AND NON-RESIDENT MEMBERS.

N. B.—Those having L. F. preceding their names have compounded for life

Year of Election.		
1870,		Abbe, George W.
1860,		Acton, Thomas C.
1869,		Aguiar (de) A. W. F.
1873,		Albert, H.
1872,		Alburtis, Edward K.
1869,		Allen, Jerome.
1872,		Allen, Horatio M.
1853,		Alsop, Joseph W.
1868,		Appleton, William H.
1859,	L. F.	Arnold, Daniel H.
1859,		Arnoux, William H.
1870,		Asher, John R.
1856,		Aspinwall, William H.
1871,		Atterbury, Rev. Wm. Wallace.
1860,		Auchmuty, Richard Tylden.
1859,	L. F.	Aymar, William.
1869,		Bailey, James Mühlenberg.
1873,		Bailey, N. P.
1856,		Ball, Henry.
1856,		Baker, Francis.
1852,	L. F.	Bancroft, George.
1868,		Banks, David, Jr.
1865,		Banvard, John.
1869,		Banyer, Goldsboro.
1873,		Barbour, J. M.
1868,		Barlow, Gen. Francis C.
1859,		Barlow, S. L. M.
1858,		Barney, Danford N.

Year of
Election.

1852,	L. F.	Barney, Hiram.
1868,		Barrett, William C.
1869,		Barrow, John W.
1868,		Beardslee, Rufus G.
1868,		Beckwith, N. M.
1868,		Beebe, Welcome R.
1857,		Beekman, James W.
1870,		Bell, George.
1865,		Bellows, Rev. Henry W., D. D.
1858,	L. F.	Belmont, August.
1868,		Benedict, Erastus C.
1868,		Bennett, James Gordon.
1869,		Bergh, Henry.
1868,		Bernheimer, Adolph.
1859,		Bernheimer, Isaac.
1868,		Bernheimer, Leopold.
1868,		Bernheimer, Simon.
1856,		Berry, Richard.
1869,		Bickmore, Prof. Albert S., M. A.
1869,		Bierstadt, Albert.
1868,		Bill, Edward.
1870,	L. F.	Bishop, T. Alston.
1856,		Black, William D.
1868,		Blake, Charles F.
1868,		Bleecker, T. B., Jr.
1872,		Blodgett, Daniel C.
1860,		Blodgett, William T.
1873,		Blood, O. Howard.
1869,		Bloomfield, William.
1869,		Boardman, Andrew.
1870,		Body, Jno. E.
1871,		Bolton, Henry C., Ph. D.
1859,		Boorman, J. M.
1856,		Booth, William T.
1857,		Booth, William A.
1870,		Botta, Prof. Vincenzo.
1873,		Bradford, James F.
1869,		Bradford, William.
1868,		Brady, John R.
1856,		Brevoort, J. Carson.
1872,		Bridgham, S. W.
1870,		Brooks, Sidney.
1872,		Brown, Walston H.

Year of
Election.

1859,	L. F.	Brown, James.
1853,		Brown, James M.
1856,		Brown, Stewart.
1872,	L. F.	Bryce, James.
1869,		Burdett, Charles P.
1853,		Butler, Charles.
1870,		Butler, Cyrus.
1871,		Butler, Benj. F.
1861,		Butterfield, Gen. Daniel.
1873,		Casey, Jos. J.
1868,		Chapman, Joseph H.
1868,		Carter, James C.
1856,		Carter, Robert.
1861,		Cary, Lucius E.
1863,	L. F.	Cary, William F.
1870,		Casserly, Bernard.
1868,	L. F.	Catlin, N. W. Stuyvesant.
1859,		Chapin, Rev. E. H., D. D.
1871,		Charlick, Oliver,
1868,		Choate, William G.
1869,		Churchill, Franklin H.
1868,		Cisco, John J.
1872,		Clark, E. V.
1859,		Clift, Smith
1864,		Clews, Henry
1856,		Colgate, Charles C.
1852,	L. F.	Colton, Joseph H.
1870,		Conger, Clarence R.
1869,		Conger, Abraham B.
1870,		Conklin, William A.
1872,		Conklin, Eugene E.
1854,	L. F.	Conkling, F. A.
1856,	L. F.	Cooley, James E.
1856,		Cooper, Edward.
1855,		Cooper, Peter.
1862,		Corse, Israel.
1873,		Coster, Charles H.
1868,		Coulter, Samuel.
1862,		Cowdin, Elliott C.
1871,		Cox, James Farley.
1872,		Cox, Samuel S.
1872,		Crain, Dunham Jones.

Year of
Election.

1862,		Crawford, S. W., Gen. U. S. A.
1856,		Crooks, Ramsey.
1870,		Cruickshank, James, LL. D.
1869,	L. F.	Cullum, George W., Maj.-Gen. U. S. A.
1858,		Currie, Gilbert E.
1856,		Curtis, Lewis.
1856,		Curtis, William E.
1855,		Daly, Charles P., LL. D.
1871,		Daly, Joseph F. ...
1866,		Darling, William A.
1870,		Dash, John B.
1870,		Davison, Edward F.
1870,		Davis, Alexander J.
1868,		Dawson, H. B.
1868,		De Costa, Rev. B. F.
1873,		Delano, Franklin H.
1868,	L. F.	Dennis, Charles.
1872,	L. F.	De Peyster, Frederick
1864,		Detmold, Christian E.
1853,		Detmold, William, M. D.
1868,		De Voe, Thomas F.
1859,		Dickerson, E. N.
1870,		Dinsmore, William B.
1869,		Dodge, Robert.
1856,		Dodge, William E.
1856,		Dodge, William E., Jr.
1856,		Doremus, R. Ogden, M. D.
1856,		Douglass, Andrew E.
1868,		Draper, Henry, M. D.
1873,		Drone, Eaton S.
1870,		Drowne, Henry T.
1868,		Du Chaillu, Paul B.
1856,		Duncan, Wm. Butler.
1855,		Dunshee, Henry W.
1868,		Duyckinck, Evert A.
1870,		Durant, Thomas C., M. D.
1873,		Dwight, James F.
1868,		Dwight. Prof. Theo. W., LL. D.
1868,		Edmonds, J. W.
1872,		Edwards, Jonathan.
1873.		Ellinger, Moritz

Year of
Election.

1856,	Elsworth, Henry.
1868,	Emmet, Thomas Addis, M. D.
1869,	Emott, James
1864,	Evans, Walton W.
1859,	Evarts, Wm. M.
1853,	Eyre, Henry S. P.
1864,	Faile, Thomas H.
1873,	Farrell, Thomas M.
1856,	Fernbach, Henry.
1856,	L. F. Field, B. H.
1854,	L. F. Field, Cyrus W.
1856,	Field, David Dudley
1869,	Field, Dudley.
1860,	Field, Rev. H. M.
1852,	L. F. Field, Hickson W.
1857,	Fish, Hamilton.
1873,	Fithian, Freeman J.
1871,	Fliess, William M.
1859,	L. F. Fogg, William H.
1869,	Forsyth, Rev. John, D. D.
1859,	Fowler, Edward P., M. D.
1873,	Freedman, John J.
1873,	Francis, John M.
1868,	Frohwein, Theobald.
1871,	Fry, Horace B.
1869,	Furniss, William.
1853,	Gaillard, Joseph.
1868,	Gambrill, C. D.
1869,	Ganse, Rev. H. D., D. D.
1868,	Gardner, A. K., M. D.
1873,	Garvin, Samuel B.
1873,	Gavit, John E. . . .
1868,	L. F. Gebhard, William H.
1873,	Gedney, Frederick G.
1869,	Gerard, James W.
1872,	Gerard, James W., Jr.
1868,	L. F. Gerry, Eldridge T.
1856,	Gescheidt, Louis A., M. D.
1869,	Gilbert, Clinton.
1868,	Gillies, James W.
1871,	Gilman, William C.

Year of Election.

1873,	Gilmore, Maj.-Gen. Q. A., U. S. A.
1873,	Glaubenskee, Theo. G.
1870,	Goldman, Marcus.
1868,	Goldsmith, Jacob.
1872,	Godon, Rear-Admiral S. W., U. S. N.
1872,	Goulding, B. L.
1870,	Graham, Gen. C. K.
1860,	L. F. Graham, James L.
1859,	Graham, R. M. C.
1868,	Green, Andrew H.
1852,	L. F. Green, John C.
1867,	Greene, Gen. G. S.
1857,	L. F. Greene, John W., M. D.
1856,	Greenwood, Isaac I.
1853,	Grinnell, Moses H.
1872,	Grinnell, R. M.
1859,	L. F. Griswold, George.
1871,	Groom, Wallace P.
1853,	Guernsey, Egbert, M. D.
1869,	Habicht, C. E.
1869,	Hadden, John A.
1868,	Hall, Elial F.
1871,	Hall, A. Oakey.
1869,	Halsted, William M.
1872,	L. F. Hamersley, John W.
1871,	Hamilton, Alexander, Jr.
1864,	Hammond, Henry B.
1871,	Hand, Clifford A.
1870,	Harris, R. Duncan.
1868,	L. F. Harris, Townsend.
1870,	Harrison, Thomas F.
1868,	Hartt, Prof. Ch. F., M. A.
1859,	L. F. Havemeyer, John C.
1870,	Havens, Charles G.
1868,	Hayes, Isaac I., M. D.
1869,	Hayes, William J.
1870,	Hawkes, Prof. W. Wright.
1869,	Hazard, Rowland R., Jr.
1872,	Hawkins, Dexter A.
1872,	Hawley, E. Judson.
1868,	Hegeman, William.
1868,	Hegeman, William A. Ogden.

Year of
Election.

1859,		Henderson, John C.
1856,		Herring, Silas C.
1870,		Hess, Julius.
1856,		Hewitt, Abram S.
1868,		Hewlett, John D.
1872,		Hoffman, William B.
1869,		Hoffman, Friedrich, Ph. D.
1868,		Hoguet, Robert J.
1872,		Holbrook, Levi.
1858,	L. F.	Holton, David P., M. D.
1868,		Hoppin, William J.
1868,		Hoyt, David.
1865,		Hull, Amos G.
1873,		Hull, C. W.
1856,		Hunt, Wilson G.
1856,		Hunter, James.
1868,		Huntingdon, Daniel.
1868,		Hurlbert, William H.
1870,		Hutchings, Robert C.
1869,		Hutchins, Waldo.
1859,		Ireland, John B.
1871,		Jackson, H. A.
1868,		Jacob, Ephraim A.
1868,		Jarvis, Nathaniel, Jr.
1870,		James, Frederick P
1852,	L. F.	Jay, John.
1872,		Joachimsen, Jos. P.
1855,		Johnson, Bradish.
1868,		Johnson, Hezron A.
1868,		Johnson, Henry W.
1856,		Johnston, James B.
1873,		Johnston, John Taylor.
1868,		Jones, Charles C., Jr.
1852,	L. F.	Jones, John D.
1871,		Jones, Walter R. T.
1868,		Joy, Prof. Charles A.
1870,		Kane, J. Grenville.
1870,		Kaufmann, Sigismund.
1855,		Kearney, Edward.
1873,		Kelley, Lieut. J. D. J., U. S. N.
1872,		Kendrick, Col. H. L., U. S. A.

Year of
Election.

1854,		Kennedy, Robert L.
1873,		Kennan, George.
1865,		King, George.
1863,		King, Oliver K.
1852,		Kingsland, A. C.
1868,		Kirkland, Charles P.
1872,		Klamroth, Albert.
1853,	L. F.	Knapp, Shepherd.
1873,		Koch, Joseph.
1870,		Kuhne, Frederick.
1862,		Lambert, E. W., M. D.
1868,	L. F.	Laue, Smith E.
1856,		Lanier, J. F. D.
1871,		Larremore, Richard L., LL. D.
1859,	L. F.	Lathers, Richard.
1873,		Latting, John J.
1868,		Lawrence, Abraham R.
1869,	L. F.	Lawrence, John S.
1871,		Lee, Ambrose.
1854,		Lefferts, Marshall.
1859,		Lenox, James.
1868,		Leonard, William H.
1868,		Leslie, Frank.
1871,		Letson, Robert S.
1872,	L. F.	Libbey, William.
1852,	L. F.	Livingston, Cambridge.
1870,		Loew, Frederick W.
1873,		Lohenstein, Baron.
1857,		Low, A. A.
1873,		Lydig, David.
1870,		Lyman, Edward H. R.
1863,		Mackie, Robert.
1871,		Macclay, Robert.
1869,		Macclay, William B.
1870,		MacMillan, Charles, M. D.
1872,		Macmillan, Frederick.
1856,		Manners, David S.
1870,		Marbury, Francis F.
1872,	L. F.	Marié, Peter.
1868,		Marquand, Henry G.
1868,		Marsh, Luther R.

Year of
Election.

1863,		Marshall, Chas. H.
1871,		Marston, Charles E.
1868,		Martin, Isaac P.
1870,		Martin, William R.
1869,		Martine, Randolph B.
1868,		Matsell, George W.
1872,	L. F.	Matthews, Edward.
1872,		Maury, Rev. Mytton.
1863,		May, Lewis.
1871,		Mayo, William S.
1858,		McClure, George.
1871,		McCreery, James A.
1868,		McKellar, William.
1868,		McLean, James M.
1859,		McMullen, John.
1872,		Meeker, H. G.
1870,		Menzies, William.
1863,		Merrick, John S.
1872,		Meyer, F. William.
1870,		Miles, Edward D.
1869,		Miller, Charles R.
1872,		Miller, Morris S.
1868,		Miller, Edmund H.
1868,		Mitchell, Grove P.
1871,		Mitchell, Samuel A.
1856,		Monroe, Ebenezer.
1868,		Montgomery, Archibald G., Jr.
1870,		Morel, E. B.
1868,		Moreau, John B.
1873,		Moore, C. B.
1859,	L. F.	Moore, Frank.
1853,	L. F.	Moore, George H.
1869,		Moore, Henderson.
1863,	L. F.	Moore, W. H. H.
1856,		Morgan, E. D.
1865,		Morgan, William D.
1859,		Morrell, William H.
1873,		Morris, Gouverneur, Jr.
1870,		Morris, Harry M.
1866,		Morris, Robert R.
1868,		Morrison, Henry.
1864,		Morton, Levi P.

Year of
Election.

1869,	L. F. Mount, Richard E.
1856,	Murdock, U. A.
1868,	Murphy, Henry C.
1868,	Murphy, Thomas.
1870,	Murray, D. Colden.
1870,	Myer, Maj.-Gen. A. J., U. S. A.
1870,	Myers, Alfred G.
1852,	Myers, T. Bailey.
1873,	Nassau, C. W.
1873,	Neilson, Frederic.
1870,	Neilson, William H.
1868,	Newberry, Prof. John S., M. D.
1856,	Niblo, William.
1856,	Nichols, Effingham H.
1859,	L. F. Norrie, Adam.
1871,	O'Callahan, Edmund B., LL. D.
1869,	O'Connor, Charles.
1868,	Ogden, Alfred.
1859,	Ogden, William B.
1857,	Opdyke, George.
1869,	O'Rielly, Henry.
1871,	Palmer, Courtlandt, Jr.
1872,	Parish, Henry.
1868,	Parton, James.
1868,	Paulison, John P.
1871,	Pavy, Octave.
1871,	Peabody, Charles A.
1869,	Perault, George.
1868,	Pfeiffer, Carl.
1862,	Phillips, George W.
1860,	L. F. Phelps, Royal.
1868,	Philbin, Stephen.
1855,	Pierrepont, Edwards.
1852,	L. F. Pierrepont, Henry E.
1873,	Platt, James N.
1873,	Plum, E.
1852,	L. F. Poor, Henry V.
1860,	Potter, Clarkson N.
1871,	Potter, Howard.
1868,	Powers, William P.
1852,	L. F. Prime, Frederick.

Year of Election.	
1859,	L. F. Prime, Frederick E.
1868,	Prime, William C.
1872,	Prime, Temple.
1869,	Pruyn, John V. L., LL. D.
1859,	L. F. Punnett, James.
1859,	Purser, George H.
1870,	Putzel, Mayer.
1857,	Pyne, Percy R.
1856,	Randolph, A. D. F.
1859,	Rapallo, Charles A.
1873,	Raynolds, C. T.
1868,	Raven, Anton A.
1859,	L. F. Reckendorfer, Joseph.
1868,	Redfield, Amasa A.
1873,	Reed, Mrs. Sylvanus.
1873,	Reinhart, B. F.
1873,	Remington, Samuel.
1856,	Remsen, William.
1868,	Rhineland, William C.
1873,	Rich, John B., M. D.
1868,	Richmond, Henry A.
1856,	Riker, John H.
1872,	L. F. Robbins, Chandler.
1873,	Roberts, E. H., M. C.
1873,	Robertson, Col. D. A.
1868,	Roberts, Marshall O.
1871,	Robinson, Douglass.
1871,	Robinson, Hamilton W.
1872,	Roelker, Bernard.
1861,	L. F. Rogers, C. B.
1869,	Rogers, David L., M. D.
1869,	Roosevelt, Theodore.
1868,	Rose, Cornelius.
1854,	Ruggles, Samuel B.
1868,	Russell, John A.
1870,	Rutherford, John A.
1854,	Rutherford, L. M.
1868,	Sanger, A. L.
1869,	Savage, John.
1873,	Saul, Emil.
1870,	Schafer, Samuel M.

Year of Election.	
1870,	Schafer, Simon.
1859,	L. F. Schell, Augustus.
1870,	L. F. Schell, Richard.
1856,	Schermerhorn, W. C.
1856,	Schieffelin, S. A.
1869,	Schmidt, Oscar E.
1871,	Schnerr, Constant.
1856,	Schuchardt, Frederick.
1868.	Schultz, Jackson S.
1859,	L. F. Schultz, John H.
1873,	Scott, Julian.
1856,	Sears, Herman B.
1870,	Seligman, James.
1870,	Seligman, Jesse.
1870,	Seligman, Joseph.
1854,	Sewall, Henry F.
1868,	Seward, Carence A.
1871,	Shaler, Gen. Alexander.
1873,	Shaw, J. T., M. D.
1868.	Shea, George.
1856,	Sherman W. Watts.
1870,	Sherwood, John.
1870,	Simpson, Gen. James H., U. S. A.
1870,	Sistare, George K.
1870,	Slevin, Edward P.
1869,	Slevin, James M.
1873,	Slevin, Thomas E.
1868,	Smales, Holbert.
1868,	Smith, Augustus F.
1869,	Smith, C. Bainbridge.
1873,	Smith, E. Delafield.
1873,	Smith, James M., Jr.
1853,	Smith, James O., M. D.
1870,	Smyth, Frederick.
1873,	Southworth, Alvan S.
1868,	Spencer, Charles S.
1873,	Spencer, James C.
1856.	Spofford, Paul N.
1868,	Squier, E. George.
1859.	Stallknecht, F. S.
1856.	Stebbins, Henry G.
1871.	Steinwehr, Gen. A. von.
1872,	Steiger, E.

Year of Election.		
1872,		Stengel, Prof. Frederick.
1870,		Stephens, Edward.
1872,		Stern, Myer.
1869,		Sterne, Simon.
1870,		Stevens, Simon.
1870,		Stewart, Charles J.
1859,		Stewart, A. T.
1870,		Stoughton, Edwin W.
1870,		Stoughton, Henry E.
1870,		Stoughton, Charles B.
1860,	L. F.	Stout, Francis A.
1870,		Stout, John.
1858,		Straznicky, E. R., M. D.
1869,		Strebeigh, Robert M.
1873,		Strong, Charles E.
1859,		Strong, George T.
1860,		Stuart Alexander
1855,		Stuart Robert L.
1873,		Sturgis, Frank K.
1873,		Sturgis, Frederick.
1872,	L. F.	Stuyvesant, Rutherford.
1861,	L. F.	Suckley, George, M. D.
1871,		Swan, William H.
1857.		Taylor, Bayard.
1868,		Taylor, Douglas.
1870,		Taylor, George.
1855,		Tellkampf, T. A., M. D.
1857,	L. F.	Thompson, David.
1854,		Thompson, Rev. Joseph P., D. D.
1870,		Thomson, James.
1857,		Thomson, Wm. H., M. D.
1870,		Tiedeman, Nicholas.
1870,		Tillman, Prof. S. D.
1856,		Tiffany, Charles L.
1868,		Tilden, Samuel J.
1872,		Tower, Gen. Z. B., U. S. A.
1873,		Townsend, Martin I.
1856,		Townsend, Randolph W.
1859,		Tracy, Charles.
1872,		Tracy, William.
1857,		Tremain, Edwin R.
1870,		Tuckerman, Lucius.

Year of
Election.

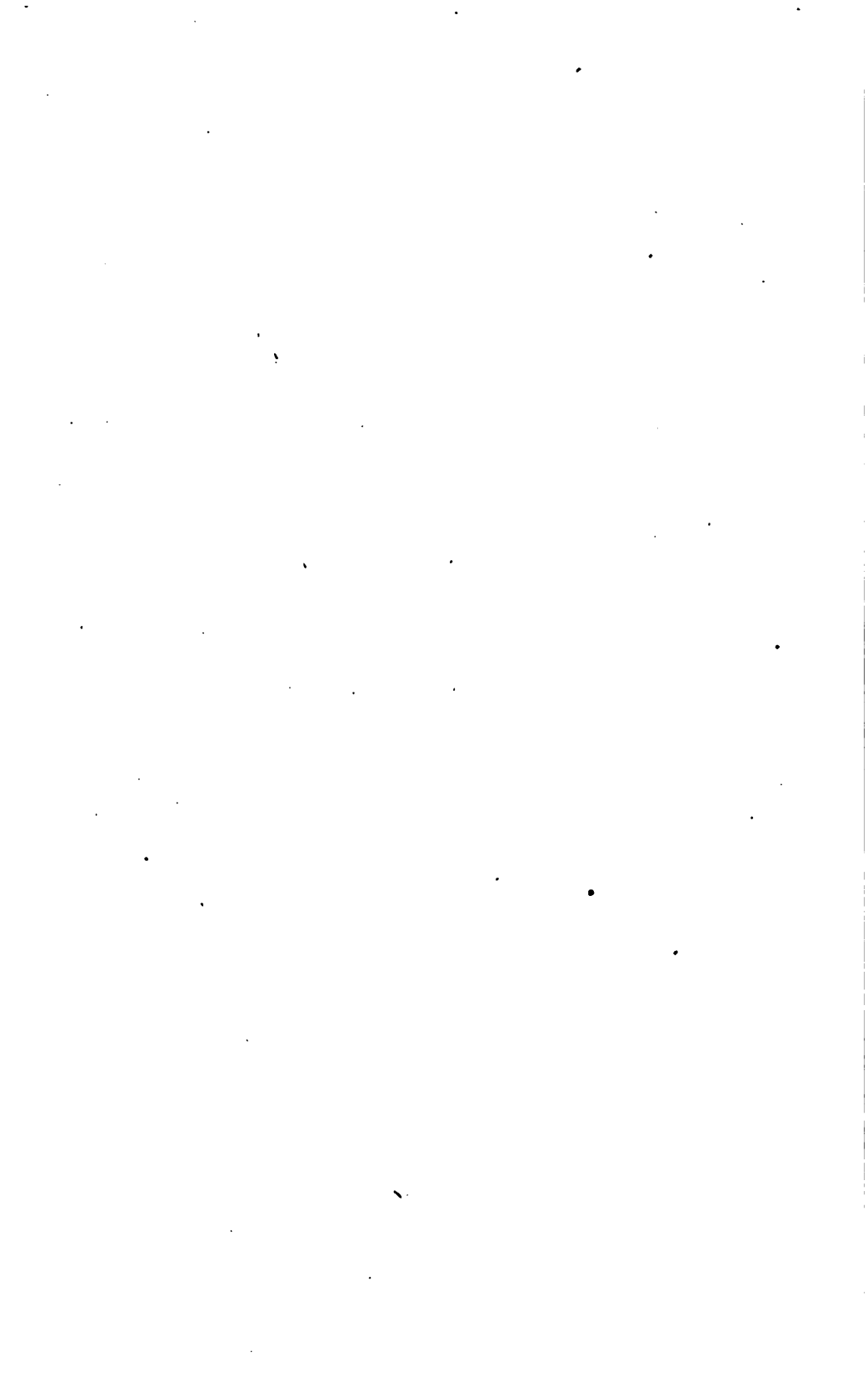
1859,		Turney, P. W.
1872,		Tyler, Arthur W.
1873,		Ullo, Lorenzo, LL. D.
1872,		Van Alen, Gen. J. H.
1872,		Van Alen, James J.
1870,		Van Brunt, Hon. Charles H.
1860,		Van Cott, Joshua M.
1869,		Vanderpoel, Aaron J.
1872,		Van Ness, Edward.
1868.		Van Santvoord, C.
1868,		Van Vorst, Hooper C.
1859,		Varnum, Joseph B.
1854,		Viele, Gen. Egbert L.
1869,		Wadsworth, E. Clifford.
1868,		Walker, Wm. Augustus.
1869,		Ward Elijah,
1859,	L. F.	Ward, George C.
1870,		Ward, Thomas W.
1856,		Warren, James K.
1853,	L. F.	Watts, Ridley.
1854,		Webb, Wm. H.
1869,		Weber, Leonard, M. D.
1870,		Webster, Sidney.
1873,		Weeks, John A.
1866,		Wendell, Jacob.
1869,		Welles, James H.
1872,		Wells, Jacob.
1865,		Wells, Samuel R.
1856,		Westermann, B.
1870,		Weston, Theo., O. E.
1872,		Wetmore, George C.
1854,	L. F.	Wetmore, Samuel.
1872,	L. F.	Wetmore, Wm. Boerum.
1868,		White, Alexander.
1856,		White, John H.
1868,		Whitewright, Wm., Jr.
1873,		Wiener, Joseph, M. D.
1871.		Wilde, Samuel, Jr.
1860,		Winston, Frederick S.
1868,		Williams, B.

Year of Election.	
1872,	L. F. Williams, Stephen C.
1870,	L. F. Wilson, Gen. James Grant.
1854,	L. F. Witthaus, G. H.
1854,	L. F. Witthaus, R. A.
1873,	Worthen William E., C. E.
1869,	Wreaks, Charles F.
1870,	Wright, E. Kellogg.
1873,	Yamada, Yokichi.
1871,	Youngs, Alfred.
1871,	Youngs, Henry I.
1868,	Zborowski, Martin.

PART I.

TRANSACTIONS OF THE SOCIETY

FOR THE YEAR 1873.



TRANSACTIONS OF THE SOCIETY FOR 1873.

Annual meeting of The American Geographical Society, Cooper Institute, New York, January 28th, 1873.

In the absence of Chief-Justice DALY, the President, Col. Conkling, one of the Vice-Presidents, occupied the chair.

The minutes of the last meeting, December 17th, 1872, were read and approved.

Col. F. A. CONKLING, as Chairman, presented the annual report of the Council, which, on motion, was accepted and ordered to be placed on file.

Mr. Henry Clews, the Treasurer, read his annual report, exhibiting a cash balance in the Treasury of \$58.05, and stating that the Society is now entirely out of debt.

On motion, the Treasurer's report was accepted and ordered to be placed on file.

Mr. Elial F. Hall, the Librarian, read his annual report, showing that during the past year 1,356 items had been added to the Society's library and map-room.

On motion, the Librarian's report was accepted, and ordered to be placed on file.

Col. Conkling, as Chairman of the Council, then reported the names of the following candidates as having been approved for election:

As resident member, Jno. J. Casey; by Mr. Robert Dodge, Dr. J. T. Rothrock, Wilkesbarre, Pa.

No ballot being called for, on motion these gentlemen were declared duly elected resident and corresponding members.

The Recording Secretary then read the amendments to the existing by-laws of the Society as proposed at the last monthly meeting on December 17th, 1872.

On motion, these amendments were accepted, and the by-laws so amended declared to be in force.

Dr. Richards, as Chairman of the Nominating Committee, then reported that the names of the following gentlemen are recommended for election as officers of the Society for the ensuing year :

For President :

CHARLES P. DALY, LL. D.

For Vice-Presidents :

F. A. CONKLING, FRANCIS A. STOUT,
T. BAILEY MYERS.

For Foreign Corresponding Secretary :

JAS. MÜHLENBERG BAILEY.

For Domestic Corresponding Secretary :

W. H. H. MOORE.

For Recording Secretary :

E. R. STRAZNICKY, M. D., PH. D.

For Treasurer :

HENRY CLEWS.

Council :

WILLIAM REMSEN, GEO. W. CULLUM, U. S. A.
W. TILDEN BLODGETT, GEO. CABOT WARD,
WILLIAM E. CURTIS, ELIAL F. HALL,
THEO. W. DWIGHT, LL. D., THEODORE ROOSEVELT,
WM. JONES HOPPIN.

The President then appointed Messrs. John W. Hamersley and Clinton Gilbert as tellers, who reported that the names of the gentlemen as recommended on the ticket were unanimously elected.

On motion, they were then declared duly elected officers of the Society for the year 1873.

The President then introduced to the Society Dr. Augustus Le Plongeon, who read a paper "On the Coincidences between the Monuments of Ancient America and those of Assyria and Egypt".

After the conclusion of the paper, and on motion of Dr. Richards, the thanks were presented to Dr. Le Plongeon, and a copy of the paper requested for the archives of the Society.

On motion, the meeting then adjourned.

Special meeting of The American Geographical Society, Cooper Institute, New York, February 17th, 1873.

Col. F. A. CONKLING, one of the Vice-Presidents, occupied the chair.

On motion of Mr. Stout, the reading of the minutes of the last annual meeting, January 28th, 1873, was postponed.

Col. T. B. Myers asked the privilege of nominating Mr. Henry Grinnell, for so many years one of the Vice-Presidents of this Society, as an honorary member without the usual reference to the Council.

On motion, it was unanimously

Resolved, That Mr. Henry Grinnell be, and is hereby declared, an honorary member of this Society.

The Chairman then introduced to the audience Chief-Justice Charles P. Daly, the President, who delivered the annual address, and selected for his subject "The Geographical Work of the World in 1872".

After the conclusion, the Rev. Dr. Bellows, seconded by Mr. Stout, moved the thanks to Chief-Justice Daly for his elaborate and highly instructive and entertaining address, and requested that a copy be furnished for publication in the Journal.

On motion, the meeting then adjourned.

Regular monthly meeting of The American Geographical Society, Cooper Institute, New York, March 25th, 1873; Chief-Justice DALY, the President, in the chair.

The minutes of the two previous meetings, January 28th and February 17th, were read and approved.

Mr. Moore, on behalf of Council, reported the names of the following candidates as having been approved for election as resident members: John B. Rich, M. D.; Chas. E. Strong, Frederick De Peyster, John E. Gavit, John T. Johnson, Frederick Sturgis, Lieut. J. D. J. Kelley, U. S. N.; Moritz Ellinger, N. P. Bailey, Thomas E. Slevin, Mrs. Sylvanus Reed, A. G. Remington, Major-Gen. Quincy A. Gilmore, U. S. A.; Eaton S. Drone, James M. Smith, Jr., James C. Spencer, David Lydig, Judge John J. Freedman, Samuel R. Garvin, Chief-Justice John M. Barbour. And as corresponding members: Lieut. Geo. M. Wheeler, U. S. Corps of Engineers; Gen. W. Milnor Roberts, Chief Engineer, N. P. R. R.; Prof. F. V. Hayden, U. S. Geological Survey of the Territories, Washington, D. C.; Prof. Benj. Peirce, Superintendent U. S. Coast Survey, Washington,

D. C.; Major-Gen. A. A. Humphreys, U. S. A., Chief of Engineers, Washington, D. C. No ballot being called for, on motion these candidates were declared elected resident and corresponding members.

Mr. Hall, on behalf of the Treasurer, read his monthly report, exhibiting a cash balance in the hands of the Treasurer of \$251.39.

The Recording Secretary reported that since the last report was rendered 337 items were added to the library by donation.

On motion, both these reports were accepted and ordered to be placed on file.

The President then introduced to the Society Alvan S. Southworth, Esq., who read a paper on "The Soudan and the Valley of the White Nile".

After the conclusion of the reading of this paper, and on motion of Prof. Harrison, seconded by Dr. Gardner, the thanks of the Society were presented to Mr. Southworth for his very entertaining and instructive paper, and a copy of it requested for publication in the Journal.

The President then introduced to the audience Henry M. Stanley, Esq., the distinguished traveller in Central Africa who had found Dr. Livingstone, who made some very interesting remarks about the country traversed by Mr. Southworth.

On motion, the meeting then adjourned.

Regular monthly meeting of The American Geographical Society, held at the hall of the New York Historical Society, New York, April 15th, 1873; Chief-Justice DALY, the President, in the chair.

The minutes of the last meeting, March 25th, were read and approved.

Col. F. A. CONKLING, Chairman of the Council, reported the names of the following candidates as having been approved for election as resident members: Franklin H. Delano, John A. Weeks, and Rev. C. C. Adams, of Manhattanville.

No ballot being called for, on motion these gentlemen were declared duly elected resident members of the Society.

Mr. Hoppin, on behalf of Mr. Henry Clews, the Treasurer, presented his report, exhibiting a cash balance in the hands of the Treasurer of \$222.81.

The Recording Secretary reported the following accessions to the library and map-room of 73 items.

On motion, both reports were accepted and ordered to be placed on file.

The Recording Secretary then read a letter from the Rev. Mr. Albert Bushnell, a missionary at the Gaboon, in Western Equatorial Africa, and corresponding member of this Society, wherein Mr. B. presents a very interesting account of the present explorations by the French and English governments.

On motion of Mr. Hall, it was

Resolved, That the thanks of the Society be presented through the Recording Secretary to the Rev. Mr. Bushnell for his interesting letter, and that the same be published in the forthcoming volume of the Society's Journal.

The President then introduced to the Society Gen. John Gibbon, U. S. A., who read a paper on "The Wonders of the Yellowstone," illustrated by stereoscopic views.

On motion of the Hon. Judge Peabody, thanks were presented to General Gibbon for his very interesting and instructive paper, and a copy of it was requested for publication in the Journal.

On motion, the meeting then adjourned.

Regular monthly meeting of The American Geographical Society, held at the hall of the New York Historical Society, November 11th, 1873, Chief-Justice DALY, the President, in the chair.

On motion of Mr. Remsen, the reading of the minutes of the last monthly meeting, April 15th, 1873, was postponed.

Mr. Elial F. Hall, on behalf of the Chairman of the Council, reported the names of the following candidates as having been approved for election :

Resident Members — C. T. Reynolds, O. Howard Blood, Baron Lohenstein, Judge Freeman J. Fithian, B. F. Reinhart, Julian Scott, William E. Worthen, Joseph Wiener, M. D.

Honorary Members — Sir Samuel W. Baker, Lady Baker, His Highness Ismail Pacha, Khédive of Egypt; Clements R. Markham, C. B., Secretary Royal Geographical Society, London.

Corresponding Members — General Kirkham, at Adowa, Abyssinia; George M. Stanley, Ashantee; George Sauer, Paris; Wm. J. McLean, Bombay, India; Dr. George W. Hosmer, London; General F. A. Starring, Herr Hansell, Imperial Austrian Consul at Khartoum; Ismail Pacha, Governor-General of the Soudan; Douglass Gibbs, Alexandria, Egypt; Lieut. Frederick Collins, U. S. N.; J. A. MacGahan, Central Asia; Mr. John P. Jackson, Berlin; Eugene Schuyler, St. Petersburg.

No ballot being called for, on motion they were declared duly elected honorary, corresponding, and resident members.

Mr. Remsen, on behalf of the Treasurer, Mr. Henry Clews, presented his monthly report, exhibiting a cash balance in the treasury of \$182.95.

On motion, the report was accepted, and ordered to be placed on file.

The President then read the translation of a letter addressed to him by Vice-Admiral de la Roncière Le Noury, President of the Geographical Society of Paris, announcing the death of their late and distinguished president, the Marquis de Chasseloup Laubat.

The President now introduced to the Society Lieut. Frederick Collins, U. S. N., who read a paper entitled "The Isthmus of Darien and the Valley of the Atrato, considered with Reference to the Practicability of an Interoceanic Canal".

After the conclusion of the reading of this paper, and on motion of Simon Stevens, Esq., seconded by the Hon. Samuel B. Ruggles, the thanks of the Society were presented to Lieut. Collins for his very able and exhaustive paper, and a copy of it was requested for publication in the Journal.

The Hon. Samuel B. Ruggles, in seconding the motion of thanks, called the attention of the Society to the very great importance of such a canal, and submitted the following resolutions:

Resolved, That this meeting, now assembled in the city of New York, at the invitation of The American Geographical Society, after listening with instruction and pleasure to the interesting report read by Lieut. Collins, of the Navy of the United States, fully recognizes the high necessity of an interoceanic canal of sufficient size to permit the passage of ships of heavy burden between the Atlantic and Pacific oceans within the territories of New Granada, Colombia, Guatemala, or Mexico,—a necessity daily becoming more and more urgent by the rapidly expanding commerce of the globe.

Resolved, That, in view of the various efforts already made by the governments and citizens of the United States and of other nations to find a practicable route for such a canal, which shall cheapen and expedite commercial intercourse between the different quarters of the globe, the meeting hereby recommends to this Society to collect and collate all the information within reach in respect to any or either of these routes, for the use of its members and the community. For such purpose the meeting refers the duty to a special committee, consisting of the President, General Secretary,

and three members of the Society, or other individuals to be designated by the President.

These resolutions, after having been seconded by Mr. Henry E. Pierrepont, were unanimously adopted, and the President has named the following committee, as provided for in the resolution : Hon. Samuel B. Ruggles, Chairman ; Chief-Justice Daly, President of the Society ; Gen. Geo. W. Cullum, U. S. A., and Alvan S. Southworth, General Secretary.

Mr. Geo. Cabot Ward presented a resolution expressing the deep regret of the Society on learning of the death of their late fellow-member, Cassius Darling.

Judge Wm. E. Curtis, in seconding the resolution, paid an eloquent tribute to the memory of the deceased, and the resolution was then unanimously adopted.

On motion, the meeting then adjourned.

Regular monthly meeting of The American Geographical Society, held at the hall of the New York Historical Society, New York, December 16th, 1873 ; Chief-Justice DALY, the President, in the chair.

On motion of Mr. Remsen, the reading of the minutes of the two previous meetings, April 15th and November 11th, 1873, was postponed.

Mr. Moore, on behalf of Council, read the report recommending the following candidates for election :

Corresponding Members — Commander E. P. Lull, U. S. N. ; Commander F. H. Baker, U. S. N.

Resident Members — Charles H. Coster, Dr. J. T. Shaw, Emil Sauer, Samuel Remington, Frederick G. Gedney, Hon. John M. Francis, Gouverneur Morris, Jr., C. W. Nassau, Yokichi Yamada, James F. Dwight, Alvan S. Southworth, James F. Bradford, Frank R. Sturgis, John J. Latting, C. B. Moore, C. W. Hull, Frederic Neilson, Lorenzo Ullo.

No ballot being called for, on motion they were declared duly elected members of the Society.

Mr. Elial F. Hall, on behalf of the Treasurer, Mr. Henry Clews, read his monthly report, exhibiting a cash balance in the treasury of \$341.47.

On motion, the report was accepted, and ordered to be placed on file.

On motion of Mr. Remsen, the following Special Committee of

three was appointed by the President to prepare suitable nominations for the election of officers for the ensuing year, to wit: Messrs. A. K. Gardner, M. D., Horatio M. Allen, and Prof. Charles A. Joy.

Mr. Francis A. Stout proposed the following amendments to the by-laws :

Resolved, That the first section of chapter 3 of the by-laws be amended as follows:

The Society shall consist of fellows, and of honorary, corresponding, and ex-officio members.

That the present first and second paragraphs shall be stricken out.

That the words "resident" and "non-resident" shall be stricken out of the sixth paragraph, and the words "fellows and" shall be inserted instead, and that the paragraphs of said chapter shall be renumbered so as to correspond with these changes.

That in chapter 4, paragraph 1, line 2, the words "resident member" shall be stricken out and the word "fellow" inserted instead; and the words "and for a non-" in said line and the whole of the third line down to the word "to" shall be stricken out.

In line 1 of paragraph 2 the words "resident member" shall be stricken out and the word "fellow" substituted; and the whole of the second line, excepting the words "five dollars", shall be stricken out, and also in the third line the words "half" and "both"; and the punctuation of this paragraph shall be altered to correspond with these changes.

In paragraph 3 of said chapter the word "fellow" shall be substituted for the word "member". In the next line, the word "fellowship" for "membership"; and in the third line, the words "if a resident member". After the word "dollar" strike out the succeeding words of the paragraph.

In paragraph 4 the words "resident or non-resident member" shall be stricken out, and the word "fellow" inserted instead; and in the fourth line of that paragraph the word "members" shall be stricken out and the word "fellows" substituted; and wherever the words "member" and "non-member" occur in the by-laws, the word "fellow" shall be substituted; and the phraseology shall be changed, whenever necessary, to accord with the spirit of these resolutions.

In accordance with the existing by-laws and on motion the above proposed amendments to the by-laws were laid on the table, to be taken up for action at the next regular meeting of the Society.

The President then alluded in very feeling words to the loss which science had sustained in the untimely death of Prof. Agassiz.

On motion of Mr. John E. Body, it was

Resolved, That a special committee of three be appointed by the President to draw up suitable resolutions and to present them to the next meeting.

The President then introduced to the Society Mr. George Ken-

nan, who read a paper on "The Mountains and Mountaineers of the Eastern Caucasus", which was illustrated by stereoscopic views.

After the conclusion, and on motion of General Wilson, seconded by Mr. Hall, the thanks of the Society were presented to Mr. Kennan for his very interesting and instructive paper, and a copy of it was requested for publication in the Bulletin.

On motion, the meeting then adjourned.

Special meeting of the Society, held December 23d, 1873, at the rooms of the Society, Cooper Institute; Chief-Justice DALY in the chair.

Col. F. A. Conkling nominated the following gentlemen, on behalf of the Council, as members. They were unanimously elected :

Resident Members—H. Albert, Thomas M. Farrell, Theodore Glaubenskle, James Jackson, Jr., Joseph Koch, George Kennan, James N. Platt, Elias Plum, Col. D. A. Robertson, E. H. Roberts, E. Delafield Smith.

Corresponding Members—Col. E. C. Boudinot, Venita, Cherokee Nation; John Schumacher, Altona, Germany.

General James H. Simpson, Corps of Engineers, U. S. Army, read a paper on Aztec ruins explored by him in New Mexico, and on Vasquez de Coronado's march, in 1540-42, in search of the seven cities of Cibola.

Col. E. C. Boudinot delivered an address on the Indian Territory and its inhabitants.

Dr. A. K. Gardner moved that a vote of thanks be presented to both speakers, and that copies of their papers be requested for publication. Adopted.

Dr. A. K. Gardner moved that the question as to whether the civilized Indians of the United States were properly treated by the government be referred to the Council and President, with power. Adopted.

On motion, the meeting then adjourned.

ANNUAL REPORT OF THE COUNCIL FOR 1873.

ROOMS OF THE AMERICAN GEOGRAPHICAL SOCIETY, }
COOPER UNION, NEW YORK, Jan. 13th, 1874. }

Agreeably to chapter six, section three of the by-laws of the Society, the Council have the honor to submit the following gen-

eral report of their proceedings and of those of the Society during the past year.

Since the date of the last annual report, nine stated meetings of the Council and seven meetings of the Society have been held.

At the last annual meeting of the Society, which was held on the 28th of January, 1873, the present Board of Officers was elected. On that occasion Dr. Augustus L. Plongeon read a paper on "The Coincidences between the Monuments of Ancient America and those of Assyria and Egypt".

On February 17th, the President of the Society delivered the annual address on "The Geographical Work of the World in 1872".

On March 25th, Alvan S. Southworth, Esq., read a paper on "The Soudan and the Valley of the White Nile".

On April 15th, Major-General John Gibbon, U. S. A., delivered an address on "The Wonders of the Yellowstone", which was illustrated by stereoscopic views.

On November 11th, Lieut. Fred. Collins, U. S. N., read a paper, illustrated by stereoscopic views, entitled "The Isthmus of Darien and the Valley of the Atrato, considered with Reference to the Practicability of an Inter-oceanic Canal".

On December 16th, George Kennan, Esq., read a paper on "The Mountains and Mountaineers of the Eastern Caucasus", which was illustrated by stereoscopic views of scenery and groups of the natives. Various costumes, implements of domestic economy, and of warfare were exhibited.

On December 23d, Brig.-Gen. James H. Simpson, of the Corps of Engineers, U. S. A., read a paper on the Aztec ruins explored by him in New Mexico, and on Vasquez de Coronado's march, in 1540-42, in search of the seven lost cities of Cibola.

Total number of members, 626.

The annual report of the Treasurer, Henry Clews, Esq., exhibits a satisfactory condition of the finances of the Society. The private subscription, which has been in operation during the last two years, is expected to yield, this year, the sum of \$1,200 in addition to the regular income of the Society.

The Recording Secretary, to whom the "charge of the rooms of the Society" is committed by the by-laws, has not prepared a written report; but the large additions which have been made to the library by donations from all parts of the world prove that the system of exchanges, which was instituted some years ago, with scientific and learned societies, both at home and abroad, has produced the most satisfactory results.

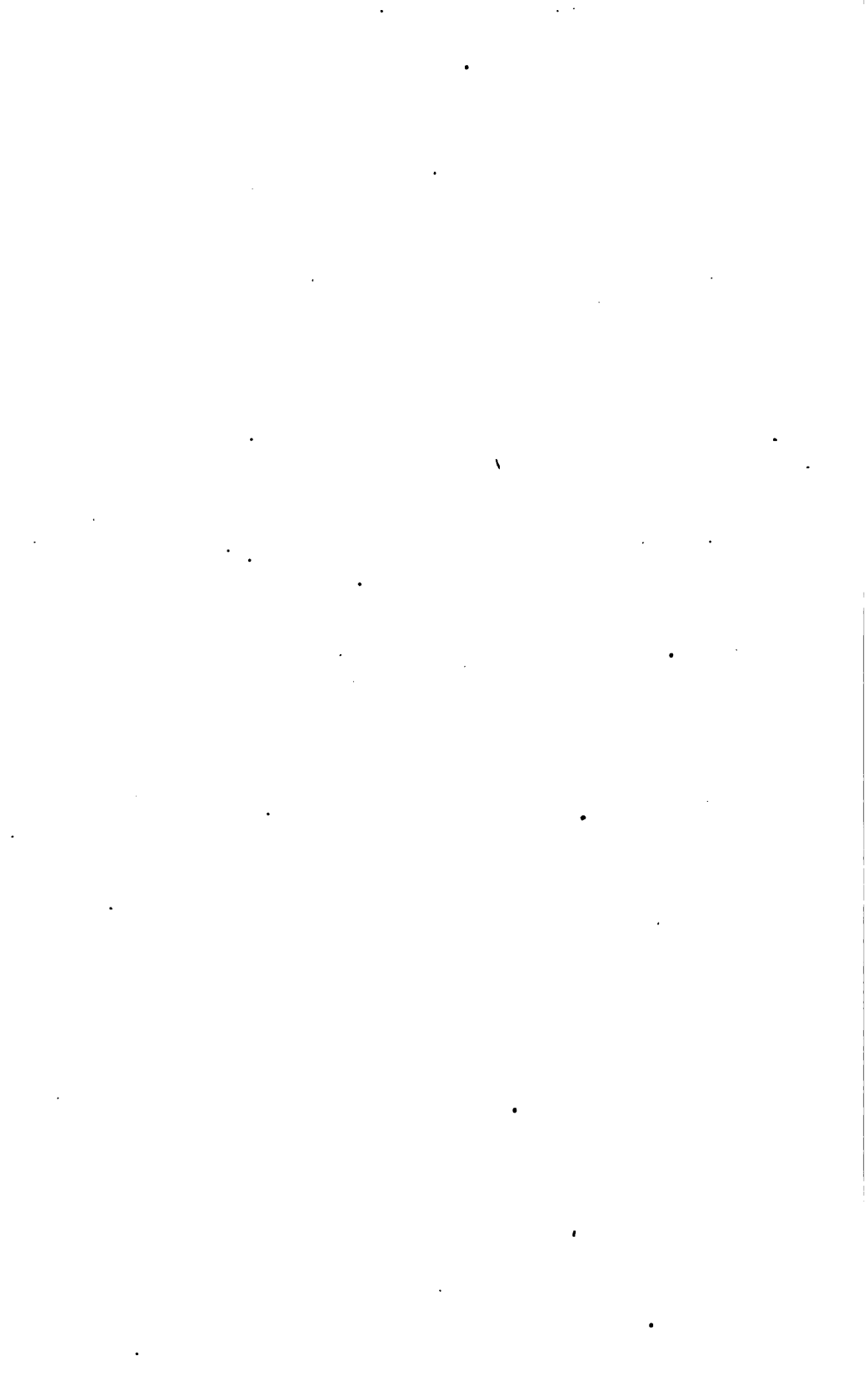
At the Vienna Exposition, the medal of progress was awarded to the Society for the extensive and valuable collection of geographical and statistical works which was there exhibited. This flattering testimonial was largely due to the agency of Francis A. Stout, Esq., one of the Vice-Presidents of the Society, to whom was personally awarded the medal of coöperation. Besides recording their sense of obligation to Mr. Stout for his generous and self-sacrificing labors in furtherance of this grand exhibition of the world's industry and progress, the Council avail themselves of this occasion to express their thanks to their colleague, James Mühlenberg Bailey, Esq., for his valuable services in preparing the Society's collection for transmission to Vienna.

The Society is especially indebted for valuable contributions of books, atlases, charts, maps, and photographs to Prof. Hayden, of the U. S. Geographical Survey of the Territories. It is also under like obligations to D. C. Gilman, Esq., the President of the University of California; to Prof. H. F. Walling and to Mr. Bartlett, of San Francisco; to Major-Gen. A. A. Humphreys, Chief of Engineers of the U. S. A.; to Rear-Admirals Sands and Davis, U. S. N.; to Profs. Nourse and Coffin, of the U. S. Observatory at Washington; and to Messrs. Watkins, Muybridge, and Houseworth, of San Francisco.

For the purpose of enabling the Society to complete and maintain its collections of maps and charts, and works upon foreign countries, the following marine insurance companies of this city have generously contributed the aggregate sum of \$500, to wit: the Atlantic Mutual Insurance Company, the Mercantile Insurance Company, the Union Insurance Company, the Orient Insurance Company. The sole condition of this appropriation of money is that the collections of the Society be held, at all reasonable hours, subject to the inspection and study of the officers and agents of the above-mentioned companies.

The Council take pleasure in recording anew their sense of obligation to Peter Cooper, Esq., and to the board of trustees of the Cooper Union, for the courtesy and liberality of their dealings with the Society, and especially for the free use of the spacious apartments which have, for so many years, been appropriated to our occupancy.

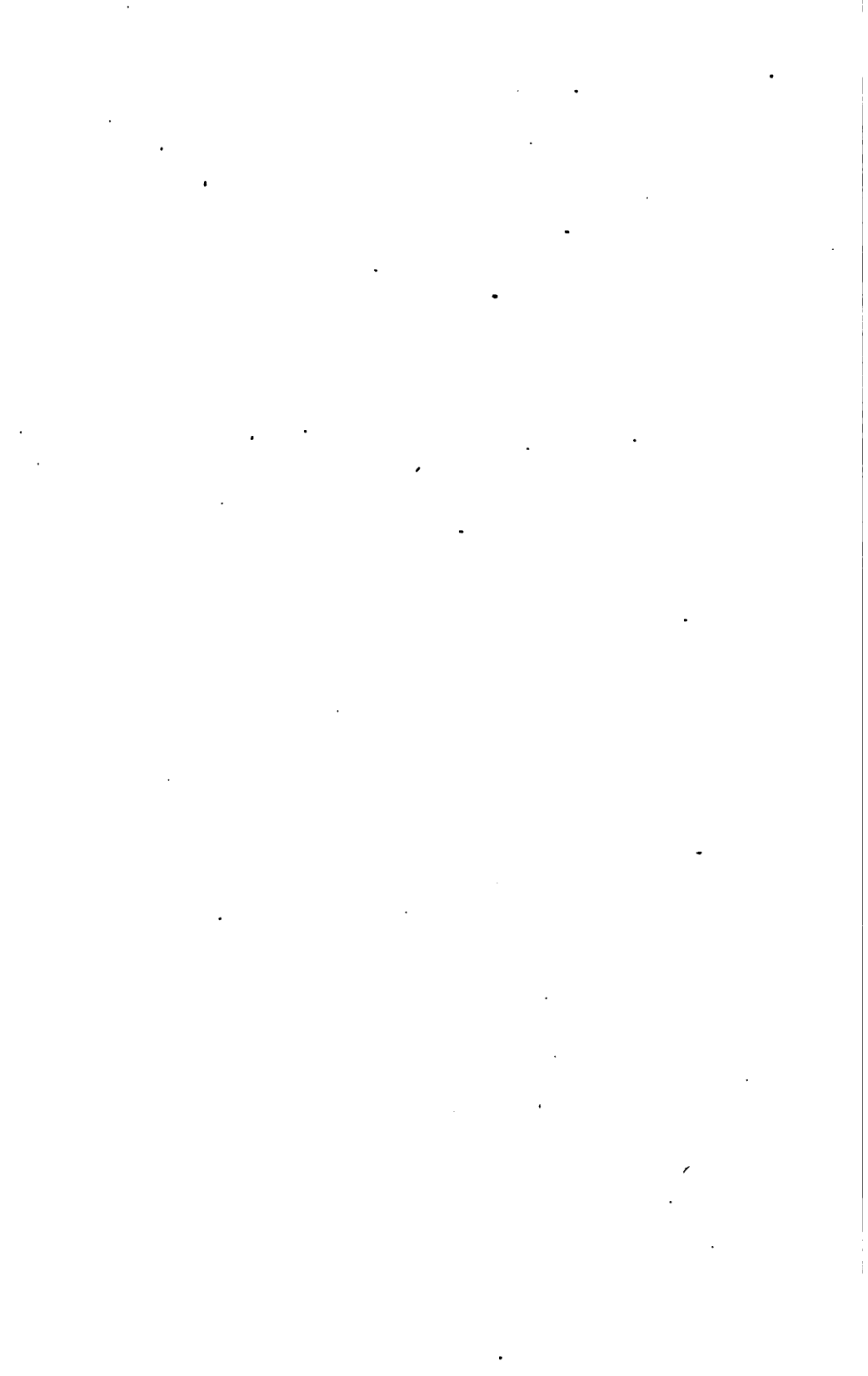
F. A. CONKLING,
Chairman of the Council.



PART II.

PAPERS READ BEFORE THE SOCIETY.

(NOTE.—THE AUTHORS ARE ALONE RESPONSIBLE FOR THE CONTENTS OF THEIR RESPECTIVE PAPERS.)



I.

ANNUAL ADDRESS.

BY CHIEF-JUSTICE CHARLES P. DALY, President.

SUBJECT: THE GEOGRAPHICAL WORK OF THE
WORLD IN 1873.

DELIVERED JANUARY 13TH, 1873.

LADIES AND GENTLEMEN AND FELLOWS OF THE GEOGRAPHICAL SOCIETY, — At a dinner given by the members of the Society last year to Mr. Stanley, a distinguished bishop, who was present, asked me what was the object of geographical societies. If the worthy bishop had expressed what was possibly passing in his mind, the form of the question perhaps would have been: What is the use of them? He no doubt felt that if he wanted to know anything about geography he had but to look into Bell or Malte Brun; that if he wanted information in respect to any particular place he had but to open the *Imperial Gazetteer*. I do not mention this in any spirit of complaint, for the bishop had not thought upon the subject, and merely expressed himself as occupied men have done in all ages. If, in the earlier part of the fifteenth century, any one had proposed in the maritime city of Lübeck, or in that hive of scholars, Padua, to organize a society to promote geographical exploration and discovery, the busy would have felt that they had no time for such inquiries, and the learned would probably have replied that all that was known would be found in Ptolemy, and that what was not to be found there was not worth being known, for it would be but expressing the opinion of a world that, up to that time, had been content to rest satisfied for thirteen centuries with what Ptolemy had to communicate. It never would have occurred to their minds that,

within a very short time, such a spectacle would be presented as that a great prince like Henry of Portugal, surnamed the Navigator, at a time when the fame of his military exploits filled Europe, should refuse the command of great armies tendered him respectively by Germany, England, and the Pope, to immure himself for the remaining forty years of his life upon a lonely promontory upon the southern extremity of Portugal, with books and instruments and the society alone of travellers and navigators, maturing that far-seeing scheme of exploration which brought the whole continent of Africa to the knowledge of mankind, and opened the way, by the Cape of Good Hope, to the coveted land of the Indies; or that the result of the conviction and efforts of a wandering sailor, upon whom the learned turned their backs, and to whom rulers would not listen, would be the discovery of a vast continent now covered with eighty millions of people, the great bulk of them the descendants of the then inhabitants of Europe.

The bishop's question may be answered by saying that during the many years that Prince Henry and his associates were collected together upon the promontory of Sagres they formed what may be called a geographical society. Perfecting themselves in the knowledge of what was known respecting the globe, they turned their attention to the unknown. Cape Bojador, that dangerous promontory which stretches out on the north-west coast of Africa, in whose boiling surge and encircling currents so many a mariner has found his grave, was then the limit of the world's knowledge of the western coast of Africa. Prince Henry wished to know what was beyond it; and when he and his associates devoted themselves to that inquiry, they engaged in the work of a geographical society whose object is the same as was his, — to promote geographical exploration and discovery. There are not now, as there were then, great highways along the ocean to be tracked or great continents to be discovered, but there is yet one seventeenth part of the globe of which we know nothing except by conjecture. The region which surrounds the south pole, the Antarctic, covers an area of seven millions of square miles. The Arctic measures nearly three millions. The unexplored portion of Africa may be put down at least as one million. The unknown part of Australia is certainly more than two-thirds of that amount, and in this connection I may mention the great islands of the East-Indian Archipelago, which stretch from the north-east corner of Asia to New Zealand, occupying the most favored part of the earth, and which have in extent the magnitude of a continent. One of this great group, Borneo, is consid

ered the second largest island on the globe. A strip along the coast of about one hundred miles deep represents what we know of it; the interior and larger portion remains unknown. Papua, or New Guinea, is as large as, and may even be larger than, Borneo. What do we know of it? Comparatively nothing. Sumatra is 1,000 miles in length, and Celebes and Luzon are inferior only to Sumatra; and there are of this group, in addition, numerous islands of considerable size, some as large as Ceylon, and thousands of minute islands, many of which abound in spices and mineral ores.*

The practical, worldly man of to day, busy in getting money, may say, "What is the use of troubling ourselves about these islands that have remained so long neglected and are occupied chiefly by savages?" That question might have been put but a few years ago in respect to Australia when England merely used it as a penal colony. It is to-day an Australasian empire. When Columbus urged John II. of Portugal to aid him in his proposed attempt to reach this quarter of the East by sailing westward across the Atlantic, an attempt in the subsequent prosecution of which he discovered the continent of America, and that navigator's plan was submitted to the King's Council for decision, the learned Bishop Diego Ortez de Cazadilla, whose speech turned the balance and effected the rejection of the scheme, did not, like the subsequent Council of Salamanca, question the possibility of its achievement, but disposed of the project by saying that it would be neither glorious nor useful; that the idea alone was sufficient to demonstrate its inutility. "Let us be counselled; instead, go and fight the Moors, who are the enemies of our religion."

I shall not dwell upon other parts of the world; the regions in South America that are imperfectly known; the portions of Asia that have been, and those that are still, shut off from all intercourse under Mongolian or Mahometan rule, and the considerable portion of our own Western country which is yet to be fully explored. Nor can I do more than mention the great domain of physical geography where so much is to be done to ascertain the laws of the movements of the winds; the direction, velocity, and temperature of the great currents of the ocean, together with the causes which regulate that vast system of waters in their circulation over two-thirds of the globe, and that much more mysterious phenomenon of terrestrial magnetism, the key to which, when obtained, will unlock the secrets or laws of forces which materially affect the physical condition of the earth, its movements, and everything upon it.

* *Borneo* — A. M. Cameron. *Illustrated Travels*, No. XLV.

It was with the view of drawing public attention to the importance of obtaining more exact geographical knowledge of the planet we inhabit that the first Geographical Society was formed in Great Britain, forty-three years ago; and that the stimulus which such a body can give to such an inquiry is very great, and the result it can produce extensive, is seen in the fact that there are now thirty-three of these societies distributed over the globe,—viz., in England, France, Holland, Belgium, Italy, Spain, Germany, Hungary, Russia, India, the United States, Mexico, Brazil, and Buenos Ayres. It is only very large societies like the Royal Geographical Society of London, which has now 2,700 members, paying two pounds each annually, and has, in addition, a permanent fund of over \$100,000, and a stipend from government, making its annual income over \$30,000, or the Imperial Russian Geographical Society, which is munificently supported by the government, that can engage in and defray the expense of explorations in the unknown parts of the earth. All these societies, however, have their influence upon public opinion, upon the governments of the countries in which they are situated, upon wealthy individuals who are willing to be useful by aiding with their means enterprises for obtaining geographical knowledge; and the result is found in the unusual activity which now prevails in this great field of inquiry. Expeditions during the year which have either returned, started, or are organizing, have been unusually numerous. In fact, at no time since the end of the fifteenth and the beginning of the sixteenth century has such zeal been manifested, or have so many enterprises been undertaken, for the exploration of the earth as during the last quarter of a century; and this is owing, in a great degree, to the influence produced upon the age by the associated effort and activity of geographical societies. Their object is not merely to accumulate and disseminate geographical information, for that will, in time, be done by the compiler and cartographer, with the aid of the scientific geographer. Their true sphere of activity is in impressing upon the age the necessity of this work, so vast in its details and so important in its results; in pointing out what is to be done, to what particular quarter exploration or inquiry should be directed, and the necessity or value of it. Instead of leaving the exploration of unknown lands to be undertaken, as it has heretofore frequently been, in a spirit of romantic adventure, their object has been to press the importance of scientific acquirements and linguistic knowledge upon all who are ready to encounter the toil, the privation, and the peril that are incident to such noble undertakings, that they may bring

back what will be honorable to themselves and useful to the world. Finally, to keep the world at this great and useful work — to make it felt in every civilized land that, in the words of Isaiah, “The voice crieth in the wildernesses, Prepare ye the way of the Lord; make straight in the desert a highway for our God. Every valley shall be exalted, and every mountain and hill shall be made low: and the crooked shall be made straight, and the rough places plain.” A command alike, and a prophecy, that to advance and spread civilization over every part of the earth is the duty of man and the end he is destined to accomplish.

COAST-SURVEY.

In giving, as has been my custom in the annual address, an account of the geographical work of the world for the year, I shall begin with a brief summary of what has been done in our own country. I have so frequently dwelt upon the value and pointed out the nature of the labors of the Coast-Survey, that I will merely name what was done last year. It has embraced operations upon the Atlantic and Pacific coasts, which in the summer were carried on on the Northern coasts, and during the winter on the Southern. The Atlantic portion has embraced surveys around the coast of Maine, Massachusetts, Rhode Island, New York, and New Jersey, particularly on the coast of Maine and adjacent islands, with which have been connected hydrographical labors, especially with reference to the tides and currents. The harbors between Portland and New York, and the harbors in the Chesapeake, have been examined for the preparation of sailing directions. On the coast of Virginia, North Carolina, Georgia, and Florida, the survey of rivers, inlets, bays, capes, etc., has either been begun or continued, and many observations have been made at different stations for latitude and longitude. Special observations have been made near North Adams, Massachusetts, for the determination of terrestrial gravity; at Port Jervis, in this State, for the magnetic elements; and, in the geodetic connection between the Atlantic and Western coasts, points have been occupied as far as Colorado; so that now every State and Territory of the Union along the belt including the thirty-ninth parallel has at least one point accurately determined in latitude and longitude. The same kind of general labors has been carried on upon the Pacific coast. It has consisted of field and hydrographic work on the coast of California and the neighboring islands and bays; the continuation of the important surveys of Columbia River, Puget Sound, and the adjacent bays and inlets, deep-sea soundings,

the geographical recognizance of the coast, and special surveys of the harbors of Alaska.

These very important labors are of the highest value, and indicate, perhaps more than any thing else, the extent of the civilization of a people. Humboldt said to me in 1851, "I do not know that your countrymen appreciate it, but your great scientific monument hereafter will be your coast-survey."

ENGINEER CORPS, U. S. A.

In the operations upon the land, in the interior rivers, upon our great lakes and in the Western country, a large amount of practical work has been done by that distinguished body, the Corps of Engineers of the Army of the United States. I would willingly give an account of their labors, but will be excused when I say that it fills a volume, which is in itself a sufficient tribute to a body upon whose scientific attainments the nation depends when imperilled in war, and from whose scientific labors it derives so much in times of peace.

Commodore Wyman, the able head of the Hydrographic Office at Washington, has courteously written to us an account of what has been done during the year in that important department, embracing hydrographic labors, surveys, new charts, and important publications.*

U. S. GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE WESTERN TERRITORIES.

The year has been one of unusual activity in explorations and surveys in this country. There have been about twenty different expeditions apart from those already referred to, and independent of the geological surveys in the different States, most of the geological

* A running survey has been made by Commander Baker, commanding U. S. S. "Wyoming", of the Gulf coast of Mexico from the Rio Grande to Vera Cruz, and material errors discovered in the longitudes of many points on this coast, a detailed account of which survey he has kindly furnished to the Society. In the Pacific Ocean a survey has been made by Commander Dewey, commanding U. S. S. "Narragansett", of the coast of the peninsula of California, and the outlying islands, from Cape St. Lucas to San Diego. The U. S. S. "Portsmouth", Commander Kerritt, has been employed searching for dangers and shoals, marked as doubtful, between the Sandwich Islands and the coast of California; and as other duties have permitted, surveys have been made of harbors on the several stations by vessels attached to the several squadrons.

Commander Belknap, U. S. S. "Tuscarora", has been employed with marked success in getting deep-sea soundings in connection with the proposed Pacific cable.

surveys which I enumerated in my last address having been continued. I could not, within the limits of this address, give even a summary account of these numerous expeditions, and must confine myself to a very brief statement of the results of the chief expeditions for the exploration of our large and imperfectly-known domain in the great West.

Dr. F. V. Hayden, the head of the organization known as the United States Geological and Geographical Survey of the Territories, to whose previous labors we owe the knowledge of the wonders in the region of the Yellowstone, has been exploring in a new field during the year, having associated with him Mr. J. T. Gardiner, the head of the geographical branch of the expedition. The field of operations has been the eastern half of the mountainous portion of the Territory of Colorado, including the mining districts and the wonderful parks, mountain-ranges, and peaks; the area explored being divided into three districts of between seven and eight thousand square miles each. Each district was about 58 miles broad and 130 miles long; the northern including the Middle Park; the middle district, the South Park; and the southern, the San Luis Valley; the whole embracing some of the grandest ranges of the Rocky Mountains at their highest points of elevation, and forming the most extended groups of high peaks to be found upon our continent. This work embraced a trigonometrical survey resting on points astronomically determined, the triangulations being carried on by Mr. Gardiner, the geographer. The work was extended 120 miles west, 100 miles north, and 120 miles south to the second base in the San Luis Valley, 140 miles north-west of Denver. A careful and most interesting account of the labors of the expedition has been given by Prof. Whitney in a series of letters published in the *New York Tribune*, supplemented by a general account of the survey by Dr. Hayden himself, of which I would willingly, if I could, give a statement, but it occupies fourteen columns of that paper. I can

The usual hydrographic notices, and notices to mariners, have been prepared as occasion required, and issued; as also the yearly lists of foreign lights. Sailing Directions for the Coast of Brazil, Part I; The Navigation of the Atlantic Ocean, Steam Lanes across the Atlantic, and Routes of Steamers between the English Channel and New York, West Coast of Africa, Part I; Sailing Directions for the Red Sea, and third supplement of Northern and Eastern Gulf Streams, have been completed and published. Fifty-eight charts have been corrected. Nine new charts are in process of engraving, and 119 have been prepared by the lithographic process. A party has been organized and the necessary instruments prepared for determining the longitude by the electric telegraph of the West-India islands and the points on the northern coast of South America where the telegraph cable has been laid.

only, therefore, refer to what was done in the most general way. The position of every leading peak in 30,000 miles square has been fixed; a very important work, for the Territory of Colorado, says Dr. Hayden, comprises one of the most interesting areas on the continent, both in a geological and a geographical point of view, forming, as it does, the centre of elevation in the great chain of the Rocky Mountains. From the summit of Mount Lincoln, he says, the eye sweeps over a wilderness of high peaks, the like of which can be found only in the Himalayas or the Andes. "We reckoned," says Prof. Whitney, "after a careful count and estimate, that we had in view more than 150 peaks, none of which were below 13,000 feet, and 50 of which, at least, were 14,000," and adds that the summit of Mount Lincoln commands points in a region of country nearly 25,000 square miles in extent. "The exploration," he says, "of this summer will settle which is the highest peak or the greatest elevation in the United States. The very heart of the Rocky Mountains, the grandest uplift of the continent, is here. The range on which we were, running north and south for 100 miles, and which is broken into peaks ranging between 12,000 and 14,500 feet, seems to be the culminating point of the forces which built up our continent." He dwells on the Maroon Mountain, so named from the exquisite beauty of its color, and upon Castle Peak, over 14,000 feet high, which may prove to be the loftiest summit. It is extraordinary, he says, to see from some high central point the variety of form, color, and dip of these sandstone mountains, and declares that there is no other region in the United States that can vie with this in all that is grand and beautiful in mountain-building.

The valley of the mountain known as the Holy Cross was found to have been once the seat of an enormous glacier which has scored and cut up the gneiss rock upon the sides of the valley for one thousand feet high; and Prof. Whitney says that it may be doubted if so desirable an example of this effect of glacial action will be found in this country. I will only add that the work this year of Dr. Hayden and Mr. Gardiner joins on to that of Mr. Clarence King in the survey of the fortieth parallel, the field-work of which is finished, and the results of which Mr. King and his associates are now preparing for publication.

YELLOWSTONE EXPEDITIONS.

There have been two expeditions to the region of the Yellowstone, one of which was under the command of Gen. Stanley, and was chiefly of a military character, to protect the work upon

the line of the Northern Pacific Railroad against threatened hostilities of the Indians, but was at the same time, as far as circumstances would permit, an exploring and scientific expedition. Their route, from the Missouri to the Yellowstone, lay through a region but little known, part of which bears the name "*Les Mauvaises Terres*", or "*Bad Lands*". The country from Fort Stevenson, on the west ledge of the Missouri, for 200 miles south, is described as a land of desolation. They passed a continuous succession of hills, or, as they are called in Dakota, "*butts*," with wide chasms and gorges between, presenting a frightful appearance. They struck the Yellowstone in the vicinity of Glendive Creek, and proceeded up the route of the river for some distance beyond Pompey's Pillar. It was found to be navigable for eighty miles above Powder River. The entire length of the Yellowstone is about 550 miles, and from the information obtained in this exploration it is inferred that it will be navigable by steamboats for about 350 miles. Coal, iron, and other minerals were found, and some rare birds, among them a species of the sky-lark. In some parts of their journey they came across natural brickyards, the clay being cracked into blocks two inches thick by a foot and a half long; and in one place Gen. Stanley, instead of cutting down timber for a bridge, collected these natural bricks, or *adobes*, and made a good one across a gulley, over which the wagons passed in safety.

CAPT. JONES'S EXPLORATIONS.

The next expedition to the Yellowstone was under Capt. Jones, whose previous explorations in the Uintah Mountains I described in my last address. Capt. Jones's expedition was directed to what may be more properly expressed as the Yellowstone country, the vicinity of the wonderful geyser-region in Northern Wyoming, which is hereafter to be the national park. The chief object of this expedition was to ascertain how this interesting region can be made accessible to the traveller by a shorter and more feasible route, and of determining the practicability of a wagon-route or a railroad through the great national park, a competent scientific corps being attached to study the wonders of this extraordinary region. The line of march lay across what is known as the Colorado Desert, flanking the south-east extremity of Wind River, thence following up the Wind River valley to Camp Brown, which is on the right bank of the Little Wind River, just above the mouth of its northern fork, from whence they entered an unsettled and almost unknown

land, where a base-line was measured from which the subsequent landmarks on their route were located. The route lay through a rolling and desolate country, in the course of which an attempt was made to ascend to the summit of a sharp peak, which they were unable to reach; but, from the elevation which they attained, about 12,000 feet, the view was "grand and terrible, presenting as far as the eye could reach a jagged mass of dark-brown volcanic rocks, black in the shadows of the falling sun". The outlet of the Yellowstone Lake was reached on the 4th of August last, and it was found that the lake basin was abundantly watered and covered with a dense growth of pine. The return-route was through Wind River valley, and it was found that it would be practicable to make a railroad or wagon-road up this valley to Yellowstone Lake.

Before this exploration, Dr. Hayden's route was the only one known to the Yellowstone Lake; and the result of the exploration is that this route can be reduced 200 miles from the railroad, and for travellers from the East, 400 miles.

The scientific results of this expedition are valuable. The scientists who accompanied it say that this region affords a large field for the geologist, botanist, chemist, and zoölogist; and that it will be a long time before they can exhaust its material. In the Yellowstone Lake there is abundance of animal life. Dr. Hilzman found animal life in springs of 124° of temperature. He analyzed the waters, and is of the opinion that they cannot be utilized for medicinal purposes. The region is one to be visited only in the summer. They had frosts during thirteen nights in August, but the vegetation was untouched, the flowers being particularly remarkable for the brilliancy and permanency of their colors. Capt. Jones confirmed a discovery which Prof. Hayden doubted, that there was a small stream of water south of the Yellowstone Lake which afterwards divides into two streams, one of which flows into the Yellowstone, and thence into the Missouri to the Gulf of Mexico; the other into Snake River, leading from thence to the Pacific. He found this little stream, and traced the course of these two rivers springing from this common point. It was a little thread of water which flows but a short distance and then divides, a little island or peninsula separating it, one stream turning on its way to the distant Pacific, and the other travelling on its course to the remote Atlantic.

LIEUT. WHEELER'S EXPLORATIONS.

I gave a very full account last year of Lieut. Wheeler's plan for his explorations and survey west of the 100th meridian. He took

the field again last spring for a continuation of this important survey with a large staff of scientific assistants, and three officers of the Engineer Corps, the whole being divided into four main parties, Topography is the chief object of the survey, but with it are connected observations in astronomy, geology, mineralogy, and natural history. The main feature this year has been the exploration of the White Mountains of Arizona and the plateaux which border them lying south of latitude 34° and east of longitude 110° ,—embracing fine farming, grazing, water, fish, and game countries, which were found entirely uninhabited by Indians. I will give the results derived from a communication in the *Tribune*, evidently written by a member of the expedition. The region traversed is one alternating between fertility and barrenness; but little rain falls, and nothing, it would seem, can be done in Colorado, New Mexico, and Arizona without artificial irrigation. New Mexico abounds with good summer grazing-grounds on the table-lands, and both it and Arizona are rich in the precious ores; but the want of water, fuel, and the cost of transportation, prevent the profitable working of the mineral district. New Mexico, it is said, is not likely to rank as a great agricultural region, but may become a rich mining-centre and a great wool-producing State. Arizona presents many facilities for agriculture. From the valley of the Rio Grande to the summit of the Sierra Nevada and west, there is every variety of soil, climate, and scenery. The amount of the rainfall is about the same as in New Mexico, but no agricultural enterprise is possible without irrigation. The middle, western, and south-western portions of Arizona are one vast desert, with only two principal streams, the Colorado and the Gila, the Gila being the more important in a utilitarian point of view. It drains a vast extent of country, and numerous tributaries have fine bottom-lands, and the mountainous country inclosing them abounds in fine grass, timber, and grain. The higher and barren mountains parallel with the Gila are rich in the precious metals and coal, and will probably sustain a mining population as the river furnishes the means of transit. The plateaux and mountains of Arizona comprise about one-sixth of its area, and are very rich in wild grasses, and are covered with fine timber, especially the White Mountain country, recently explored and now opened for settlement. It is plentifully watered, and offers great inducements to immigrants. The Colorado plateau is a pasture-ground of great excellence for hundreds of miles, but wants water. The country adjoining the Colorado River is probably the hottest in the United States, and is almost destitute of vegetation. The

maximum heat in summer is found to be 130° Fahrenheit, and the minimum in winter is 25°. The thermometer reaches 90° nearly every day in the year, and, what is very remarkable, no case of genuine sun-stroke has ever occurred west of the Rocky Mountains.

YALE COLLEGE EXPEDITION.

The Western exploring expeditions which have been instituted by Prof. Marsh, of Yale College, were continued during last summer, and embraced a journey of 700 miles, from Salt Lake City to a point on the Columbia River west of the mouth of the Des Chutes River. The Blue Mountains were crossed, the Shoshone Falls visited, and the route on approaching the Columbia was through the valley of the John Day,—a region as yet but imperfectly delineated upon our maps. The observations made during the journey seemed to warrant the conclusion that Salt Lake had formerly a northern outlet, and the terraces examined indicated that the lake is but the remains of what was once a vast body of water equalling in magnitude our great lakes. That the lake had at an earlier period a southern outlet into the Colorado is already known. The region about the John Day River was carefully explored by Prof. Marsh, and found to be a very rough country. In the pliocene formation were found the remains of various species of fossil horses, rhinoceroses, and camels. The collections made were numerous, and five tons of specimens were brought back.

The explorers received great attention from the Mormons, which has this curious explanation :

In the Book of Mormon, certain events are related as occurring in the prehistoric period of America, in which horses are mentioned. The Spanish historians state that no horses were found in America, and that they were introduced by the Spaniards, a statement relied upon as proof of the fabrication of the Mormon work. The discovery, therefore, by Prof. Marsh, last year, of the fossil horses in Oregon has given great satisfaction to the Mormons, being regarded by them as proof of the inspiration of the Book of Mormon.

The deposit of the fossil remains of animal and vegetable life in these treeless and desert plains is so great, that the geologist will be able to reconstruct the physical history of these long past ages. Dr. Hayden, in 1857, discovered on the Niobrara River one of these graveyards, as he calls them, in which the remains of animals are entombed. He found several species of extinct camels and a great variety of horses,—one about the size of our ordinary domestic animal, another about as large as a Newfoundland dog, which had

three hoofs to each foot — and Dr. Leidy has identified no fewer than twenty-seven species of the horse family which lived upon the continent before the appearance of man, or about three times as many species as there are now throughout the world.

A party have explored Crater Lake, in Oregon, twenty-five miles from Klamath. It was found to be thirty miles in circumference without any shore, being entirely surrounded by high volcanic walls, and presented a scene of weird and wild magnificence. It is a place of great religious reverence among the Indians. Whence this vast body of water comes or where it empties is unknown. It is evidently the crater of a volcano, and probably one of the largest in the world.

W. H. DALL'S EXPLORATIONS IN THE ALEUTIAN ISLANDS.

The expedition, under the direction of Wm. H. Dall, to the Aleutian Islands and their vicinity is especially interesting. It has embraced observations upon the meteorology, specific gravity, and temperature of the sea-water, both at the surface and at various depths, and of the nature and direction of the oceanic currents of the North Pacific as well as of the tides of the Aleutian Islands, which have been ascertained to be of a compound and very complex character. The climate of the islands is found to be mild and uniform, not so cold as that of Philadelphia; but the barometer is subject to many and extreme fluctuations. Surveys have been made of several harbors, especially of the harbor of Kyska, with reference to its feasibility as the landing-station of the Japanese cable, which, after the examination of the other harbors, appears to be the only one that meets all the requirements. Islands were ascertained to be erroneously located, and reefs assumed as connecting islands were found not to exist. Deep-sea soundings were taken, and no current appears to exist in the eastern part of Behring Sea. Collections were made of prehistoric crania from caves, and of bone and stone implements and carvings. It was found that the fauna and flora do not exhibit Asiatic influences in a westerly direction, but, on the contrary, become more Arctic and meagre in their character, until at last, on the westernmost island, they are nearly wholly Arctic.

A survey was made during the year of the Colorado Desert to the Gulf of California, with a view of converting a part of the desert into a lake, by turning the waters of the Colorado River into it, which, if achieved, would greatly ameliorate the climate of Southern Cali-

fornia and make a large part of it habitable. Of the result of the survey, however, I have no information.

Dr. T. Sterry Hunt, our corresponding member, has been investigating the paleogeography of the United States as illustrated by the formations which exist and the changes which have taken place in the Blue Ridge of Virginia, and the Carolinas, especially as shown in the decay of the crystalline rocks which make up the great eastern barrier range of the Appalachian valley and its causes. His conclusion is that the Blue Ridge, which is one of the oldest mountain-elevations of our continent, has not, like the White and Green Mountains, which are a part of the same great chain, been submerged since that remote time when the deposit of the fossiliferous rocks began.

A party succeeded with great difficulty in making their way to Lake Okeechobee, a great dismal lake in Florida, from twenty to forty miles wide, and supposed to be sixty miles long, which is surrounded in part by a dense forest of cypress, and in part by vast impenetrable swamps, the tall reeds which grow in great profusion upon its shores entirely concealing it from view. The explorers sounded in what they supposed to be the centre of the lake, and found it to be 170 feet deep. They discovered four islands, and upon one about six miles long, upon a high cliff, they found a semi-circular arrangement of rude stones facing the east, in front of which was a stone structure or pile about twenty feet square. The question naturally arises, was this a stone circle erected for religious rites, like the stone piles which are found extensively dispersed throughout Europe, in India, in Palestine, and in Persia, and which are supposed to have had a common origin? A question I will leave to the archæologist.

Having opened this archæological subject, I may as well give here a brief account of the archæological results of the year.

ARCHÆOLOGICAL DISCOVERIES.

Many years ago, Mr. D. O. King, of Newport, R. I., transmitted a paper to this Society giving an account of the extraordinary ruins he had explored in Cambodia, in a journey made to that country from Siam.

We have now an account of their exploration by the French government, conducted by Lieut. Garnier, who has described the remains of what is known as the city of Angkor. Its ruins are distinguishable for their magnificence, the elaborateness of the sculpture,

and their extent; the four sides of the principal temple measuring two miles and a quarter. Wandering through the remains of endless roads, buried in forests and jungle, Lieut. Garnier came upon the ruins of monument after monument, each, if possible, more astonishing than the preceding. The architecture and sculpture exhibit a very advanced knowledge of the arts, and the main temple is described as the masterpiece of some unknown Michel-Angelo. A Chinese traveller, in 1292, described Angkor as a splendid city; and, about 300 years later, Ribodeneira refers to it as an ancient ruin in Cambodia. This is all that there is of its history.

The expedition of Mr. Smith for the investigation of the Assyrian remains has been especially fruitful. He last year brought home 400 inscriptions throwing light upon the history, astronomy, geography, mythology, and language of Assyria, besides various objects of art, domestic utensils and implements. It will be remembered that the very interesting tablets heretofore discovered by him, giving an account of the Deluge, were in one part defective; and it will be gratifying to know that he has this past year discovered the missing portion, and that this curious record is now complete.

Three catacombs were discovered near Kertch, in the Crimea, in the interior of which were paintings in fresco, in bright colors, representing battles. These tombs are supposed to be the work of an Oriental people, from the weapons and costume of the warriors, which resemble those found on the Assyrian monuments. The battles represent a struggle between men without beards, with lances and shields, and whose bodies are covered to their knees with armor, whilst their adversaries have beards and thick long hair, and are armed with bows, lances, and square shields. The bearded men appear as if besieged, and the tombs and frescoes are supposed to be the work of the men without beards.

The recent excavations made in Rome have revealed that the ancient city before the republic, in the time of the kings, was large, strongly fortified, and must have contained an immense population. This is contrary to the impression of modern historical critics, and confirmatory of the tradition which prevailed in Rome in the time of Livy. A large number of photographs taken of the excavations in their present state have been exhibited during the year in London, which show the great size and importance of the earliest buildings in Rome. The foundations of the ancient city have been laid open, which consist of enormous works, many of which were great tanks and wells. The foundations are constructed of oblong blocks

of tufa put together without mortar, the style of building being the same as that found in the ruins of Etrurian cities.

The Etruscan language has hitherto been a sealed book. The ruins of Etruria are of the deepest interest, and the inscriptions found there very numerous; but no one has been able heretofore to decipher them. A key at last is said to have been discovered. Two dice were recently found in a tomb, which, in place of being marked with pips, or dots, as is usual, are marked instead with words, and these words are identical with the first six digits in the Altaic branch of the Turanian family of languages. Following this clew, the Rev. J. Taylor has investigated 3,000 Etruscan inscriptions; and if his conclusions should be correct, these two dice will, in connection with previous researches, do for the Etruscan language very nearly what the Rosetta Stone did for the Egyptian hieroglyphics.

Dr. H. Schliemann terminated his excavations upon the supposed site of Troy last summer. He thinks that he has discovered the Skaean gate, Priam's palace, the tower of Ilium, and the great wall described by Homer. He writes Mr. Southworth, our Secretary, of his discovery of a great wooden box containing jewels, precious stones, ornaments and arms, such as battle-axes, shields, and an immense goblet of pure gold, with two handles and two mouths, which box, he says, has disappeared. He writes that the Greeks will not allow him to make excavations in Greece unless he give up all that he discovers, and that his next excavations will probably be in Sicily.

In the island of Delos a whole temple has been laid bare, and the ruins of a city discovered; and additional excavations, attended with important discoveries, have been made in Pompeii.

The scientific world was startled by the announcement during the year that Mr. F. Calvert, a geologist, had discovered in the Dardanelles conclusive proofs of the existence of man at a time so remote as the miocene period of the tertiary age, the most important of which was a rude engraving of a quadruped upon the fragment of a bone, which must have been the work of human hands; but subsequent investigations have thrown doubt upon the correctness of his conclusions as to the age of which these remains belong.

A stone has been found on a farm in Parahyba, in Brazil, containing an inscription, which, upon examination by the director of the Museum of Rio Janeiro, was found to be in Phœnician characters. I refrain, until further corroboration, from saying any thing more respecting this discovery, which, if an ancient memorial, would

prove that the Phœnicians had visited America at a very early period.

Additional discoveries have been made during the year in Europe of lake-dwellings and of caves, containing human skeletons and implements of the same general character as have been brought to light during the past few years.

Prof. W. C. Kerr, geologist, of North Carolina, has discovered that the large mica beds of that State have been extensively worked by the aborigines, for what purpose is not known, but he supposes for mirrors or window-glass, as plates of mica are frequently found there three feet in diameter.

Dr. Schmidt, of Essen, in Germany, who passed some time in this country in anthropological investigations, states, in a paper just published, that there have been well-authenticated instances of the discovery here of human remains of extreme antiquity; and that a skull found in California is the oldest specimen of human remains yet discovered in any part of the world; that it places the existence of man beyond the glacial period, and, what is very remarkable, that the skull is of a comparatively high type, showing that the race to which it belonged must have had a considerable development at that time. Geologists find that the oldest rocks are upon our continent. This skull, if Dr. Schmidt's opinion should be confirmed, would show also that the earliest evidence of man is here; and it would be very curious if, as has heretofore been hinted, the ruins of Mexico and Central America should prove to belong to the earliest civilization upon the globe. It would show that Columbus, instead of discovering a New World, discovered an old one.

ARCTIC.

If in my last address I expressed great apprehension of the fate of the "Polaris", and my hope that a vessel would be sent out to search for her; apprehensions but too fully confirmed by the subsequent news of the extraordinary escape of Capt. Tyson and his associates, and the later news of the picking-up of the remainder of the officers and crew by the Dundee whaler, the "Arctic". Great praise is due to the Secretary of the Navy for the promptitude with which he despatched the "Juniata" and the "Tigress" to search for the survivors; an act in which he had the sympathy and approval of the whole people. It is to be regretted that Capt. Hall, through whose energy and perseverance Congress was induced to authorize this expedition, did not survive to enjoy the fruits of it, and to be

regretted, when so much was gained, that the attempt was not made to do more. It was an unusually favorable year, or, what is called in Arctic phraseology, a very open one. When the farthest point was attained, $82^{\circ} 16'$ north latitude, the vessel had made a run of 600 miles in five days; and, if we leave out her detentions, she had made the run from New York to that point, the farthest ever attained by a ship, in nearly the same time that it would have taken her to cross the Atlantic. When she was stopped there it was by loose ice, she being then little more than 400 miles from the pole.

I feel that it is a delicate thing to say that a further advance might have been made, as there is not only a difference of opinion upon that point amongst those who were on board, but it is difficult to reconcile the various statements that have been given, so as to know exactly the true state of facts. Capt. Tyson tells me that at 12 m. on that day when the vessel was stopped by the ice, he saw from the mast-head open water in almost every direction beyond, and land lying as far north as he could see, and that there was then a clear water-sky ahead. Tyson further says that afterwards the channel was open to the north-east, and that the vessel could have gone further north, but that Capt. Hall, yielding to the opposition of Capt. Buddington, decided (against the views of all the other officers) to abandon any further attempt to advance. I have conversed very fully with four of the crew,—Kruger, Anthing, Nindeman, and Lingvist,—whom I found to be experienced seamen, and very intelligent men. They do not agree with Capt. Tyson, that it was feasible to get further north with the vessel. Kruger, an exceedingly intelligent man, who was on duty as the look-out, when the further progress of the vessel was stopped by the ice, at 6 o'clock A. M., says the morning was misty, but that he could see about a mile ahead, and that there was no sign anywhere of open water. They all unite in the statement that there was a steady current flowing into the mouth of Robeson's Channel from the north, at the rate of about a mile an hour, and drift-wood upon either shore, but say that from the large flakes of heavy ice that were coming down, and the entire absence of any swell, they were of opinion that there was no open sea beyond. Kruger afterwards carefully observed an elevated position north of Newman's Bay, the trend of the land both at the east and the west, from the highest point reached, as far as it was visible with a glass. He states that he saw a bay or strait which sets in to the westward immediately north of Cape Union; that it was narrow, and he supposes it to be

a strait, as he could see no termination; that north of this bay or strait a highland extends in a north-easterly direction, and that the water-sky which Capt. Tyson supposed he saw was the mist upon this highland. In his opinion, the current sets along this land from N. N. E. into Robeson's Channel, bringing down the heavy flakes of ice which blocked up the mouth of the channel, and obstructed the further progress of the "Polaris". On the opposite or Greenland side when it reaches its farthest northern limits at 83°, the land, it was found, trends to the east, indicating that Greenland is probably an island. From this configuration there would appear to be water to the north-east, extending over considerable space which may then have been so covered with ice as to prevent the passage of a ship. But no attempt was made to investigate, although, as I have stated, Tyson declares that there was a channel open to the north-east, at the very time when it was decided to advance no farther. It is difficult to understand why a further attempt was not made in that direction, as there was at least a possibility, even if the pole could not have been reached, that the vessel might have gone to the east or north-east, and possibly have come around the east coast of Greenland, which, if accomplished, would have been one of the proudest achievements in the history of Arctic exploration. That more was not accomplished must, if Capt. Tyson's statement is correct, be attributed to the influence of the second officer, who had what Hall had not, a knowledge of navigation and previous Arctic experience, but who, from Tyson's account, did not share in Hall's enthusiasm and determination to reach the pole; whilst, on the other hand, the men with whom I have conversed insist that Capt. Buddington's course was judicious; that as the season was far advanced it would have been incurring great risk to have attempted then to get further north; that Capt. Buddington was an able seaman, who had had, in the command of vessels, great experience in Arctic navigation; and that his advice to Hall to return and find a safe winter harbor was the counsel of the man on whom the whole responsibility rested, as he was the one upon whom everybody on board depended.

As the American theory has constantly been that the true course to reach the pole is by the way of Smith's Sound; as that was the belief of Kane, and the conviction of Hayes, and is confirmed by what was accomplished by the expedition of the "Polaris", it is to be hoped that the American government will not stop, now that the way is indicated, and allow another nation to accomplish what we have done so much to attain; but that, on the contrary, the honor

which will follow the accomplishment of this great geographical achievement will be the reward of American enterprise, and that the first flag which floats over the pole will be our national ensign.

The Swedish expedition under Prof. Nordenskjöld having failed in its attempt to reach Parry Island, the vessels went into Mussell harbor in Spitzbergen, and in three days were inextricably shut in by the ice. This had scarcely occurred when the startling news reached them that six Norwegian fishing-vessels, with an aggregate of fifty-eight men, were frozen in near a neighboring promontory. Nordenskjöld's own resources were limited, as one of his vessels was to return to Sweden when they were all frozen in. He said, however, to the Swedish fishermen, that if they would conform strictly to discipline he would share his food with them, and advised them of an abandoned house at Ice Fiord, to which eighteen of the Norwegians went. Two of the Norwegian vessels were relieved by a storm in November, 1872, and thirty-eight reached home after vainly attempting to rescue their countrymen at Ice Fiord. In the spring of 1873, Capt. Meck went to their rescue and found them all dead. A diary had been kept from the 7th of October to the 3d of March, 1873, the perusal of which showed beyond doubt that they had lost their lives from want of experience, having practised no bodily exercise nor busied themselves in any employment. The preservation of the Swedes who returned safely last August, and who had been in the same situation, was due to their constant employment, discipline, and active bodily exercise. They lost but two men; the remainder returned in good health. This admirably organized expedition accomplished little in its attempt to get near the pole, and adds but another proof to the difficulties that exist in that direction. The scientific results of the voyage, however, are considerable. By dredging and by magnetic, meteorological, botanical, and geological observations, they gathered a large amount of information throwing light on the nature of organic life in the Arctic, and upon the physical changes which that region has undergone.

Prof. Mohn, of Christiania, has published an elaborate account of the land east of Spitzbergen, explored by three Norwegian captains in 1872, which is valuable as it is the first accurate account of what was discovered, and is accompanied by a map laying down the routes of the explorers, and the position of the land.

In May last, Mr. B. L. Smith, in the steamship "Diana" with his yacht, the "Samson", as a tender, made a voyage to Spitzbergen, and, being unable to penetrate beyond $79^{\circ} 30'$ north latitude, was

compelled to put back, when he proceeded to Mussell Bay, where he found the Swedish expedition. He afterwards renewed his attempt, but the furthest point north reached by him was $80^{\circ} 56'$ in east longitude 70° . He returned in September last, having found North Cape to be an island. In the course of the voyage he made some surveys, took numerous soundings, and brought back a collection of botanical and zoölogical specimens.

The "Albert," which was sent out toward the close of 1872, to rescue the crews of the Norwegian vessels before referred to, made during her voyage a number of observations upon the temperature of the air, of the sea, of the currents, and upon barometric pressure and the wind, which are of great value to the science of meteorology.

Capt. Potter, who returned last year in the "Glacier" from a whaling-voyage in the Arctic, and is now in this city, passed some time in the vicinity of the place where Sir John Franklin and his companions abandoned their vessels. He procured from the natives in Repulse Bay various relics, such as silver spoons, forks, etc. He heard from them an account, in which he places reliance, of the division of the survivors into two parties; of the manner of the death of Sir John and his associates; and thinks, from the narration given, that he knows where the remains of those that perished will be found.

No news has been received from the "Tegethof", of the Austrian expedition for the exploration of the sea east of Nova Zembla, whose last destination, August, 1872, was Cape Tscheljuskin, the northernmost point of the continent of Asia. A vessel was despatched from Tromsø for Nova Zembla to make inquiries, but she had not returned before the winter set in.

Capt. Markham, R. N., went in the Dundee whaler, the "Arctic," to make observations in reference to the contemplated expedition from England for the discovery of the north pole. The vessel went into the Gulf of Boothia, an entirely new whaling-ground, where whales were found in great abundance. At Port Leopold, at the entrance of Prince Regent inlet, the provisions left there by Lieut. James Ross, twenty-five years ago, were found in excellent preservation and fit for use. Also, at the place where Capt. Parry wintered more than fifty years ago, the provisions deposited by him were found pretty much in the state in which he had left them. At Cape Garry, on Melville Peninsula, Capt. Markham found an abandoned Esquimaux settlement of thirty-four huts formed of the skulls and ribs of whales. From the indications pre-

sented, he concluded that the settlement had not been inhabited for a century.

THE ISTHMIAN CANAL.

The practicability of a ship-canal across the Isthmus of Darien has been tested by an exploring expedition under Commander Selfridge. Briefly stated, the route, on this line, selected by Commander Selfridge, which is by the way of the Atrato from the Gulf of Darien, and terminating on the Pacific near Cupica, contains one hundred miles of river navigation of the Atrato, which can be navigated by the largest ocean-steamers. An artificial cut of only twenty-eight miles in length is necessary between the Atrato and the Pacific. During twenty-two miles of this distance the rise would amount to but ninety feet, and would be gradual. The six miles to the Pacific include an open cut and a practicable tunnel three miles long. The cost of the whole is estimated at \$60,000,000, and ten years would be required to complete the work.

The Nicaragua Surveying Expedition, under Commander Lull, has proved the existence of a practicable route for an interoceanic ship-canal, beginning near Greytown on the Gulf of Mexico, ascending the San Juan River to the lake, and terminating on the Pacific at Brito, having Lake Nicaragua at its summit-level. The total length of the proposed canal is sixty-one miles and seventy-four hundredths of a mile, of which nearly forty-eight are in excavation and embankment. No tunnel is required. The harbors at Greytown and Brito, the two extremities of this route, it is thought, can be readily improved.

SOUTH AMERICA.

Prof. James Orton, of Vassar College, N. Y., has just returned from South America, where he had been engaged in a second exploration of the Amazons. The general object of his recent travels in South America was to supplement his expedition in 1867, when he crossed the continent from west to east, *via* Quito and the Nipo wilderness.* The chief object of his exploration was to study the

* His route in 1873 was up the Amazon from Para to Yurimaguas on the Hoallaga River; thence up the Paravapura and its tributary, the Cachiyeen, to Balsa Puerto; thence over the Icuto range on foot to Moyobamba; thence across and among the Andes to Chachapoyas and Cayamarca, crossing Upper Mavañon, or Balsas, and striking the coast at Pacasmayo; thence to Lima and its immediate region; thence to Mollendo, Arequipa, and Puno on the shore of Lake Titicaca.

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The government of Peru has for some years been expending vast sums of money in exploring the little-known portions of Peru which lie to the west of the Andes ; and Señor Raimondi, a scientific man of the highest character, has, in the service of the government, been also exploring the remote valleys between the Cordilleras and at the head-waters of many of the rivers which flow down the northern slopes to the eastern plains,— a work in which he has been engaged for twenty years. The announcement is now made that the labors of Señor Raimondi are to be utilized in the publication, by the government, of a magnificent illustrated work, which is to embrace a narrative of his explorations, and the result of all his researches upon the geography, natural history, and climate of Peru.

EUROPE.

The main geographical work of Europe has been the carrying-on of those great topographical surveys by the nations which I mentioned in my last address, a geographical labor the value of which has been strikingly illustrated by the late war between Germany and France. When France moved to invade Germany she was not only wanting in a geographical knowledge of the country she was about to enter, but even of her own territory ; whilst the people she meant to attack were a nation of geographers, thoroughly acquainted with the topography of their own country and accurately informed of the geography of France, so far as it was material in aggressive or defensive military movements. Whilst the commander of the French army was hovering upon the borders of Germany, considering at what point he would invade it, he found his army suddenly enveloped and placed at disadvantage by topographical movements on the part of the Germans, so rapid, unerring, and masterly that, instead of invading Germany, the French were thrown at once upon the defensive, a position from which they were never allowed to recover ; each strategic movement of the Germans being followed by the defeat of the enemy, until the whole organized military force of France was overcome, and the terms of peace, which involved a dismemberment of the nation and the payment of the expenses of the war, were dictated by the Germans in the armed possession of Paris.

This remarkable event, the sudden demoralization and rapid conquest of a great nation, was the result of skilful military movements, performed by an army thoroughly acquainted with all the geographical features of the country over which it was moved. It was a war

fought as much by maps as by weapons. The military read that directed it remained in his tent, giving his orders surrounded by his maps. Each officer had his map; and no military body, however small, moved in any direction without being provided with a most accurate map and other information of the country through which it was to pass. In other words, geographical knowledge was organized, subdivided, and distributed with the same system and order as rations, arms, or ammunition. This instructive lesson has its warning. It teaches that, if the fate of a nation may depend upon a battle, a battle may depend upon a knowledge of geography,—a significant indication to every country of the importance of the science for the advancement of which geographical societies have been instituted.

A congress was held in Vienna to arrange for the measurement of a segment of an arc of the meridian in the centre of Europe. It was agreed to adopt as the European measure of length the metre fixed by the French commission, and that the measurement of the segment should be from Christiania to Palermo.

M. Houfaldy has completed and published the result of his explorations and researches in the Finnish provinces on the Baltic. The name of the people, Finns, he says, is derived from "lake", and that "Finlander" means "lake-dweller". His researches in the language and ethnology are very valuable. He describes the people as moral, frugal, highly cultivated, and intensely national. They have a national literature, and conduct their proceedings in their courts of law in their own language. He says that as a race they are totally different from their German or Slavonian conquerors, and thinks that they are destined hereafter to fill a larger place in the world's history.

A private individual, Prince Torlonia, has accomplished what Augustus, Claudius, and Nero had attempted in vain. He has drained that pestilential marsh, Lake Fucina, in Italy, forty-two miles in circumference, and the land which it covered is now cut into large squares of fertile territory, intersected by magnificent roads. The work occupied fifteen years, employed 80,000 persons, and cost Torlonia more than \$5,000,000. The question was whether he would drain the lake, or the lake drain Torlonia. He has answered it.

A recent survey of the tract lying between France and Germany shows that the River Aar is the true Rhine, and the stream which falls over Schaffhausen is merely a tributary.

Our member, M. Du Chaillu, has been occupied for the last year

in following up his previous explorations and studies in Sweden, Norway, and Lapland. He has traversed these countries thoroughly in various directions, having made two visits to North Cape, the most northern point of Europe, of which he has taken photographs. He has given especial attention to the remarkable features of the country, its natural history and physical geography, studying the great glaciers of Scandinavia, and the geological changes resulting from the rising and sinking of the land. Great facilities have been afforded him by official persons and the people generally, with whom he has mixed extensively, familiarizing himself with their language, character, customs, and habits. He has taken a large number of photographs, particularly of natural scenery and objects of scientific or archaeological interest. He has just returned to this city, and is now occupied in the preparation of a work upon Sweden, Norway, and Lapland, which I am sure will be one of great interest.

METEOROLOGY AND HYDROLOGY.

A meteorological congress was held last summer in Vienna, in which the agreement was unanimous as to the great importance of one synchronous observation of the weather at all stations throughout the world.

Our own signal-service throughout the year has been materially extended, stations having been erected on the elevated ranges of the Rocky Mountains.

T. B. Butler, of this country, has recently published a work upon meteorology, distinguished by original views, the practical knowledge of the writer, and by the discussion of facts more than theories. He denies Halley's hypothesis that storms are produced by the upward suction of heated tracts of air, and maintains that electricity is the chief cause of meteorological phenomena.

The national school-ship "Mercury", of this city, commanded by Capt. Giraud, has been engaged during the year in deep-sea researches. Capt. G. surveyed a large portion of what is called the volcanic region of the Atlantic Ocean, where he found the water very deep, and the specimens brought up indicating a volcanic origin. A deep-sea thermometer was used upon one occasion at a depth of 2,040 fathoms, two miles north of the equator, in 22° 16' west longitude. At the surface the temperature was 81° Fahr.; at 1,000 fathoms, 38°; at the greatest depth, 35°; and in the voyage from the Canary Islands to Rio Janeiro it was found at uniform depths to vary only about two degrees.

The "Challenger", the objects of whose voyage I gave an account of in my previous address, when last heard from was on her way to the Cape of Good Hope, where she is to refit; that point being the completion of the first stage of the expedition. Her earliest deep-sea sounding was taken off Cape Finesterre, in 1,125 fathoms; and her deepest sounding was southward of Saba Island, one of the Dutch West-India Islands, in 3,875 fathoms, nearly four miles and a half; the enormous length of line which was run out to the bottom in about one hour and a quarter having about three hundredweight of sinkers. A measurement of the meridian was made by means of the electric telegraph between Gibraltar and Malta. Star-fish brought up from 600 fathoms near Cape Vincent were unable to adapt themselves to the various degrees of pressure, and when relieved from that to which they had been accustomed they expanded to bursting.

The soundings between Lisbon and Madeira indicated that a submarine basin similar to that of the Mediterranean and Black Sea existed there, with its outlet between Madeira and the Canary Islands. Capt. I. E. Davis, R. N., from whose communication I have derived most of the particulars of the labors of the expedition during the year, says that if the configuration of the ocean-bed in this vicinity could be seen with Madeira on the north and Teneriffe on the south, it would rival the loftiest range of the Himalayas in grandeur and sublimity. A crustacean similar to the lobster or prawn, brought up from 1,900 fathoms, was found to be without eyes. In very deep-sea soundings (3,150 fathoms) in the tropics, longitude $35^{\circ} 11'$ west, the dredge brought up no trace of organic matter; the bottom, which extended for 700 to 800 miles, being a smoot clay of a reddish color; and wherever over this section the water exceeded a depth of 2,700 fathoms, this red clay was found. The last important intelligence received is, that, in the further course of the vessel south, a cold current was discovered running north along the coast of Brazil, the temperature being 32.5 at a depth of under 2,500 fathoms.

Prof. Mohn, of Christiania, has been investigating the results of the observations of deep-sea temperatures between Greenland, Spitzbergen, and the North of Europe. He finds that the Gulf Stream in summer is warmest on the surface-layer close to the coast of Norway, and from there exhibits a sensibly decreasing temperature with the depth until the freezing-point is reached; and that the fiords of Norway, that are protected by their banks from the great Atlantic

depths, are filled to the bottom with the water of the Gulf stream.

The temperature of the winds and the currents of the ocean have, for some time, been the subject of extensive observations by the Dutch. Fifty-one thousand observations made by officers of the Dutch navy in the Atlantic, after careful study, have been arranged and published in a series of charts by the Royal Meteorological Institute of the Netherlands. These charts give the surface-temperature of the North Atlantic between 30° and 52° north latitude and zero, and 50° west longitude, which is the route chiefly traversed by vessels between Europe and America. This is a most valuable contribution to our knowledge of the surface-temperature of the ocean, and comes appropriately from the countrymen of Varenus, the founder of the science of physical geography.

A bottle is said to have been picked up last summer upon the coast of Alabama, containing a writing stating that it had been sent from a foundered ship called the "James", off Alaska, June 29th, 1870. If this should be true, this bottle would seem to have drifted through the North and South Pacific oceans; to have doubled Cape Horn, passed by the great equatorial current into the Caribbean Sea, and thence around the Gulf of Mexico until it reached the territory of the United States again, on the shores of Alabama, and would indicate, to a certain extent, the connection and direction of currents in this long circuit.

ASIA.

Asia has been during the year a scene of considerable activity in geographical exploration. Mr. Ney Elias, with but a single Chinese servant, made a most important and difficult journey from Pekin through Chinese Tartary and across the desert of Gobi to St. Petersburg; determining positions by astronomical observations at certain points on the route, so that the geography of the region traversed can now be correctly laid down. One of the chief objects of this journey was to search for the ruins of the ancient capital of Genghiz Khan; but no ruins could be found where the city was assumed to be by Du Halde and Yule. In the thirteenth century it was a vast camp of the great Khan, and the traveller Rubruquis found there goldsmiths from Paris and traders from various parts of Europe.

Baron Von Richthofens has made an extensive examination of some of the northern provinces of China, with a view mainly to ascertain their mineral resources and agricultural products. The account given of his journey and its results are exceedingly interesting

and important. His investigation has been thorough, and the information he has brought back is of the most definite kind respecting the geography, the people, the natural resources, and the present political condition of the country. He tells us that, in the wide distribution of coal, China is one of the most favored countries upon the earth. Her coal-fields cover 400,000 square miles, and yet not a single mine is worked. Her supply of iron, moreover, is inexhaustible, and she smelts very little. If we had a few more such explorations, we would know something of China.

Dr. Martin, the physician of the French legation at Pekin, has written a paper upon the population, geographical position, and climate of Pekin. His conclusion respecting the population is, that it has been greater than it is now; that it has decreased during the present dynasty; that it has never been so great as has been commonly supposed in Europe; and that it now consists of between 800,000 and 900,000 Chinese, 35,000 Mahometans, and about 200 Europeans. I may add that the Abbé A. David is exploring the province of Chen-Si.

We have now a definite account of the interesting journey to which I referred in my last address, of Mr. Fedchenko, the Russian traveller, from Khojend to the source of the Syr Daria, or Jaxartes, embracing the exploration of the Alai range of mountains,—a journey of much geographical importance. It has fixed the position of the watershed between the Syr Daria and the Oxus, and led to the discovery of the northern source of the Oxus and the gigantic Trans-Alai Mountains, behind which is supposed to lie the Pamir Steep, which Mr. Kennan, who read before us the interesting paper on the Caucasus last month, hopes at some future day to explore. Mr. Fedchenko heard that the plateau of the Pamir Steep is a very extensive plain, so high and with the air so rarefied that the Kirgheez cannot live there. It is deeply to be regretted that this distinguished traveller and naturalist, after surmounting all the perils and trials of this journey, lost his life last summer in the glaciers of Switzerland.

The Russian campaign of this summer, which has culminated in the capture of Khiva, has produced and will continue to produce most important geographical and political results. The letters of Mr. J. A. MacGahan, the *Herald* correspondent in Central Asia, have furnished valuable and accurate information as to the nature of these changes, the most important of which is the addition of the right bank of the Oxus to the Russian dominions, embracing

which will follow the accomplishment of this great geographical achievement will be the reward of American enterprise, and that the first flag which floats over the pole will be our national ensign.

The Swedish expedition under Prof. Nordenskjöld having failed in its attempt to reach Parry Island, the vessels went into Mussell harbor in Spitzbergen, and in three days were inextricably shut in by the ice. This had scarcely occurred when the startling news reached them that six Norwegian fishing-vessels, with an aggregate of fifty-eight men, were frozen in near a neighboring promontory. Nordenskjöld's own resources were limited, as one of his vessels was to return to Sweden when they were all frozen in. He said, however, to the Swedish fishermen, that if they would conform strictly to discipline he would share his food with them, and advised them of an abandoned house at Ice Fiord, to which eighteen of the Norwegians went. Two of the Norwegian vessels were relieved by a storm in November, 1872, and thirty-eight reached home after vainly attempting to rescue their countrymen at Ice Fiord. In the spring of 1873, Capt. Meck went to their rescue and found them all dead. A diary had been kept from the 7th of October to the 3d of March, 1873, the perusal of which showed beyond doubt that they had lost their lives from want of experience, having practised no bodily exercise nor busied themselves in any employment. The preservation of the Swedes who returned safely last August, and who had been in the same situation, was due to their constant employment, discipline, and active bodily exercise. They lost but two men; the remainder returned in good health. This admirably organized expedition accomplished little in its attempt to get near the pole, and adds but another proof to the difficulties that exist in that direction. The scientific results of the voyage, however, are considerable. By dredging and by magnetic, meteorological, botanical, and geological observations, they gathered a large amount of information throwing light on the nature of organic life in the Arctic, and upon the physical changes which that region has undergone.

Prof. Mohn, of Christiania, has published an elaborate account of the land east of Spitzbergen, explored by three Norwegian captains in 1872, which is valuable as it is the first accurate account of what was discovered, and is accompanied by a map laying down the routes of the explorers, and the position of the land.

In May last, Mr. B. L. Smith, in the steamship "Diana" with his yacht, the "Samson", as a tender, made a voyage to Spitzbergen, and, being unable to penetrate beyond $79^{\circ} 30'$ north latitude, was

compelled to put back, when he proceeded to Mussell Bay, where he found the Swedish expedition. He afterwards renewed his attempt, but the furthest point north reached by him was $80^{\circ} 56'$ in east longitude 70° . He returned in September last, having found North Cape to be an island. In the course of the voyage he made some surveys, took numerous soundings, and brought back a collection of botanical and zoölogical specimens.

The "Albert," which was sent out toward the close of 1872, to rescue the crews of the Norwegian vessels before referred to, made during her voyage a number of observations upon the temperature of the air, of the sea, of the currents, and upon barometric pressure and the wind, which are of great value to the science of meteorology.

Capt. Potter, who returned last year in the "Glacier" from a whaling-voyage in the Arctic, and is now in this city, passed some time in the vicinity of the place where Sir John Franklin and his companions abandoned their vessels. He procured from the natives in Repulse Bay various relics, such as silver spoons, forks, etc. He heard from them an account, in which he places reliance, of the division of the survivors into two parties; of the manner of the death of Sir John and his associates; and thinks, from the narration given, that he knows where the remains of those that perished will be found.

No news has been received from the "Tegethof", of the Austrian expedition for the exploration of the sea east of Nova Zembla, whose last destination, August, 1872, was Cape Tscheljuskin, the northernmost point of the continent of Asia. A vessel was despatched from Tromsø for Nova Zembla to make inquiries, but she had not returned before the winter set in.

Capt. Markham, R. N., went in the Dundee whaler, the "Arctic," to make observations in reference to the contemplated expedition from England for the discovery of the north pole. The vessel went into the Gulf of Boothia, an entirely new whaling-ground, where whales were found in great abundance. At Port Leopold, at the entrance of Prince Regent inlet, the provisions left there by Lieut. James Ross, twenty-five years ago, were found in excellent preservation and fit for use. Also, at the place where Capt. Parry wintered more than fifty years ago, the provisions deposited by him were found pretty much in the state in which he had left them. At Cape Garry, on Melville Peninsula, Capt. Markham found an abandoned Esquimaux settlement of thirty-four huts formed of the skulls and ribs of whales. From the indications pre-

sented, he concluded that the settlement had not been inhabited for a century.

THE ISTHMIAN CANAL.

The practicability of a ship-canal across the Isthmus of Darien has been tested by an exploring expedition under Commander Selfridge. Briefly stated, the route, on this line, selected by Commander Selfridge, which is by the way of the Atrato from the Gulf of Darien, and terminating on the Pacific near Cupica, contains one hundred miles of river navigation of the Atrato, which can be navigated by the largest ocean-steamers. An artificial cut of only twenty-eight miles in length is necessary between the Atrato and the Pacific. During twenty-two miles of this distance the rise would amount to but ninety feet, and would be gradual. The six miles to the Pacific include an open cut and a practicable tunnel three miles long. The cost of the whole is estimated at \$60,000,000, and ten years would be required to complete the work.

The Nicaragua Surveying Expedition, under Commander Lull, has proved the existence of a practicable route for an interoceanic ship-canal, beginning near Greytown on the Gulf of Mexico, ascending the San Juan River to the lake, and terminating on the Pacific at Brito, having Lake Nicaragua at its summit-level. The total length of the proposed canal is sixty-one miles and seventy-four hundredths of a mile, of which nearly forty-eight are in excavation and embankment. No tunnel is required. The harbors at Greytown and Brito, the two extremities of this route, it is thought, can be readily improved.

SOUTH AMERICA.

Prof. James Orton, of Vassar College, N. Y., has just returned from South America, where he had been engaged in a second exploration of the Amazons. The general object of his recent travels in South America was to supplement his expedition in 1867, when he crossed the continent from west to east, *via* Quito and the Nipo wilderness.* The chief object of his exploration was to study the

* His route in 1873 was up the Amazon from Para to Yurimaguas on the Hoallaga River; thence up the Paravapura and its tributary, the Cachiyeen, to Balsa Puerto; thence over the Icuto range on foot to Moyobamba; thence across and among the Andes to Chachapoyas and Cayamarca, crossing Upper Mavation, or Balsas, and striking the coast at Pacasmayo; thence to Lima and its immediate region; thence to Mollendo, Arequipa, and Puno on the shore of Lake Titicaca.

physical geography, geology, and topography of the Amazons, and he obtained a vast amount of new and reliable information. He found that the Upper Amazon (Marañón) had been grossly misrepresented in all the more recent maps of Peru. He made everywhere, but especially in Northern Peru, large collections in natural history, throwing light upon the distribution of animal life, and was successful in unearthing a valuable collection of incarial art. He studied, also, the commercial resources of the region bordering the Amazons and its various tributaries, and will condense the results of his expedition in a work on the physical geography, natural history, and commercial resources of the valley of the Amazon. This distinguished traveller and naturalist has added a great deal of valuable knowledge to the geography and zoölogy of Amazonia.

Our member, W. H. Hurlbert, Esq., has, during the year, made a journey through the several states of Central America, and thence, by way of Panama, to Lima, whence he crossed the Cordilleras of the coast by Mollendo and Islay to Arequipa. In company with Mr. Thorndike, the engineer-in-chief of the Puno Railway, he went in the first train which crossed the Grand Cordilleras at a height of 15,634 feet, and thence to Lagumillas and Lake Titicaca. From Peru, Mr. Hurlbert passed by Bolivia and Chili, and through the Strait of Magellan to Rio Janeiro, and is now preparing for publication an account of this extensive journey, and the information, geographical and otherwise, he has gathered.

The locomotive, on the trial from Arequipa to Puno, reached Inlica, thirty-three miles from Puno, and near the northern shore of Lake Titicaca, on the 7th of September last, so that the difficulties of crossing the Andes by rail are now overcome.

The singular phenomenon occurred in Bolivia, of the rapid disappearance of land near La Paz. At one o'clock in the morning, on the 29th of August last, a sudden noise was heard, and on the following morning it was found that a large and fine tract of land, situated at the foot of the heights of Potosi, had gone down out of sight. Five Indian huts, with their gardens, suddenly disappeared, and other houses in the vicinity were left in ruins.

Capt. Musters, who had accomplished the extensive journey through Patagonia, made the attempt during the year to pass from Valdivia to his farthest north-west point when exploring Patagonia. He reached a lake, after crossing the pass of Ronco, in $40^{\circ} 12'$ north latitude, at an elevation of 2,540 feet, his farthest point; whence he returned across the snowy plains to Valdivia.

The government of Peru has for some years been expending vast sums of money in exploring the little-known portions of Peru which lie to the west of the Andes ; and Señor Raimondi, a scientific man of the highest character, has, in the service of the government, been also exploring the remote valleys between the Cordilleras and at the head-waters of many of the rivers which flow down the northern slopes to the eastern plains,— a work in which he has been engaged for twenty years. The announcement is now made that the labors of Señor Raimondi are to be utilized in the publication, by the government, of a magnificent illustrated work, which is to embrace a narrative of his explorations, and the result of all his researches upon the geography, natural history, and climate of Peru.

EUROPE.

The main geographical work of Europe has been the carrying-on of those great topographical surveys by the nations which I mentioned in my last address, a geographical labor the value of which has been strikingly illustrated by the late war between Germany and France. When France moved to invade Germany she was not only wanting in a geographical knowledge of the country she was about to enter, but even of her own territory ; whilst the people she meant to attack were a nation of geographers, thoroughly acquainted with the topography of their own country and accurately informed of the geography of France, so far as it was material in aggressive or defensive military movements. Whilst the commander of the French army was hovering upon the borders of Germany, considering at what point he would invade it, he found his army suddenly enveloped and placed at disadvantage by topographical movements on the part of the Germans, so rapid, unerring, and masterly that, instead of invading Germany, the French were thrown at once upon the defensive, a position from which they were never allowed to recover ; each strategic movement of the Germans being followed by the defeat of the enemy, until the whole organized military force of France was overcome, and the terms of peace, which involved a dismemberment of the nation and the payment of the expenses of the war, were dictated by the Germans in the armed possession of Paris.

This remarkable event, the sudden demoralization and rapid conquest of a great nation, was the result of skilful military movements, performed by an army thoroughly acquainted with all the geographical features of the country over which it was moved. It was a war

fought as much by maps as by weapons. The military read that directed it remained in his tent, giving his orders surrounded by his maps. Each officer had his map; and no military body, however small, moved in any direction without being provided with a most accurate map and other information of the country through which it was to pass. In other words, geographical knowledge was organized, subdivided, and distributed with the same system and order as rations, arms, or ammunition. This instructive lesson has its warning. It teaches that, if the fate of a nation may depend upon a battle, a battle may depend upon a knowledge of geography,—a significant indication to every country of the importance of the science for the advancement of which geographical societies have been instituted.

A congress was held in Vienna to arrange for the measurement of a segment of an arc of the meridian in the centre of Europe. It was agreed to adopt as the European measure of length the metre fixed by the French commission, and that the measurement of the segment should be from Christiania to Palermo.

M. Houfaldy has completed and published the result of his explorations and researches in the Finnish provinces on the Baltic. The name of the people, Finns, he says, is derived from "lake", and that "Finlander" means "lake-dweller". His researches in the language and ethnology are very valuable. He describes the people as moral, frugal, highly cultivated, and intensely national. They have a national literature, and conduct their proceedings in their courts of law in their own language. He says that as a race they are totally different from their German or Slavonian conquerors, and thinks that they are destined hereafter to fill a larger place in the world's history.

A private individual, Prince Torlonia, has accomplished what Augustus, Claudius, and Nero had attempted in vain. He has drained that pestilential marsh, Lake Fucina, in Italy, forty-two miles in circumference, and the land which it covered is now cut into large squares of fertile territory, intersected by magnificent roads. The work occupied fifteen years, employed 30,000 persons, and cost Torlonia more than \$5,000,000. The question was whether he would drain the lake, or the lake drain Torlonia. He has answered it.

A recent survey of the tract lying between France and Germany shows that the River Aar is the true Rhine, and the stream which falls over Schaffhausen is merely a tributary.

Our member, M. Du Chaillu, has been occupied for the last year

in following up his previous explorations and studies in Sweden, Norway, and Lapland. He has traversed these countries thoroughly in various directions, having made two visits to North Cape, the most northern point of Europe, of which he has taken photographs. He has given especial attention to the remarkable features of the country, its natural history and physical geography, studying the great glaciers of Scandinavia, and the geological changes resulting from the rising and sinking of the land. Great facilities have been afforded him by official persons and the people generally, with whom he has mixed extensively, familiarizing himself with their language, character, customs, and habits. He has taken a large number of photographs, particularly of natural scenery and objects of scientific or archæological interest. He has just returned to this city, and is now occupied in the preparation of a work upon Sweden, Norway, and Lapland, which I am sure will be one of great interest.

METEOROLOGY AND HYDROLOGY.

A meteorological congress was held last summer in Vienna, in which the agreement was unanimous as to the great importance of one synchronous observation of the weather at all stations throughout the world.

Our own signal-service throughout the year has been materially extended, stations having been erected on the elevated ranges of the Rocky Mountains.

T. B. Butler, of this country, has recently published a work upon meteorology, distinguished by original views, the practical knowledge of the writer, and by the discussion of facts more than theories. He denies Halley's hypothesis that storms are produced by the upward suction of heated tracts of air, and maintains that electricity is the chief cause of meteorological phenomena.

The national school-ship "Mercury", of this city, commanded by Capt. Giraud, has been engaged during the year in deep-sea researches. Capt. G. surveyed a large portion of what is called the volcanic region of the Atlantic Ocean, where he found the water very deep, and the specimens brought up indicating a volcanic origin. A deep-sea thermometer was used upon one occasion at a depth of 2,040 fathoms, two miles north of the equator, in 22° 16' west longitude. At the surface the temperature was 81° Fahr.; at 1,000 fathoms, 38°; at the greatest depth, 35°; and in the voyage from the Canary Islands to Rio Janeiro it was found at uniform depths to vary only about two degrees.

The "Challenger", the objects of whose voyage I gave an account of in my previous address, when last heard from was on her way to the Cape of Good Hope, where she is to refit; that point being the completion of the first stage of the expedition. Her earliest deep-sea sounding was taken off Cape Finesterre, in 1,125 fathoms; and her deepest sounding was southward of Saba Island, one of the Dutch West-India Islands, in 3,875 fathoms, nearly four miles and a half; the enormous length of line which was run out to the bottom in about one hour and a quarter having about three hundredweight of sinkers. A measurement of the meridian was made by means of the electric telegraph between Gibraltar and Malta. Star-fish brought up from 600 fathoms near Cape Vincent were unable to adapt themselves to the various degrees of pressure, and when relieved from that to which they had been accustomed they expanded to bursting.

The soundings between Lisbon and Madeira indicated that a submarine basin similar to that of the Mediterranean and Black Sea existed there, with its outlet between Madeira and the Canary Islands. Capt. I. E. Davis, R. N., from whose communication I have derived most of the particulars of the labors of the expedition during the year, says that if the configuration of the ocean-bed in this vicinity could be seen with Madeira on the north and Teneriffe on the south, it would rival the loftiest range of the Himalayas in grandeur and sublimity. A crustacean similar to the lobster or prawn, brought up from 1,900 fathoms, was found to be without eyes. In very deep-sea soundings (3,150 fathoms) in the tropics, longitude $35^{\circ} 11'$ west, the dredge brought up no trace of organic matter; the bottom, which extended for 700 to 800 miles, being a smoot clay of a reddish color; and wherever over this section the water exceeded a depth of 2,700 fathoms, this red clay was found. The last important intelligence received is, that, in the further course of the vessel south, a cold current was discovered running north along the coast of Brazil, the temperature being 32.5 at a depth of under 2,500 fathoms.

Prof. Mohn, of Christiania, has been investigating the results of the observations of deep-sea temperatures between Greenland, Spitzbergen, and the North of Europe. He finds that the Gulf Stream in summer is warmest on the surface-layer close to the coast of Norway, and from there exhibits a sensibly decreasing temperature with the depth until the freezing-point is reached; and that the fiords of Norway, that are protected by their banks from the great Atlantic

depths, are filled to the bottom with the water of the Gulf stream.

The temperature of the winds and the currents of the ocean have, for some time, been the subject of extensive observations by the Dutch. Fifty-one thousand observations made by officers of the Dutch navy in the Atlantic, after careful study, have been arranged and published in a series of charts by the Royal Meteorological Institute of the Netherlands. These charts give the surface-temperature of the North Atlantic between 30° and 52° north latitude and zero, and 50° west longitude, which is the route chiefly traversed by vessels between Europe and America. This is a most valuable contribution to our knowledge of the surface-temperature of the ocean, and comes appropriately from the countrymen of Varenus, the founder of the science of physical geography.

A bottle is said to have been picked up last summer upon the coast of Alabama, containing a writing stating that it had been sent from a foundered ship called the "James", off Alaska, June 29th, 1870. If this should be true, this bottle would seem to have drifted through the North and South Pacific oceans; to have doubled Cape Horn, passed by the great equatorial current into the Caribbean Sea, and thence around the Gulf of Mexico until it reached the territory of the United States again, on the shores of Alabama, and would indicate, to a certain extent, the connection and direction of currents in this long circuit.

ASIA.

Asia has been during the year a scene of considerable activity in geographical exploration. Mr. Ney Elias, with but a single Chinese servant, made a most important and difficult journey from Pekin through Chinese Tartary and across the desert of Gobi to St. Petersburg; determining positions by astronomical observations at certain points on the route, so that the geography of the region traversed can now be correctly laid down. One of the chief objects of this journey was to search for the ruins of the ancient capital of Genghiz Khan; but no ruins could be found where the city was assumed to be by Du Halde and Yule. In the thirteenth century it was a vast camp of the great Khan, and the traveller Rubruquis found there goldsmiths from Paris and traders from various parts of Europe.

Baron Von Richthofens has made an extensive examination of some of the northern provinces of China, with a view mainly to ascertain their mineral resources and agricultural products. The account given of his journey and its results are exceedingly interesting

and important. His investigation has been thorough, and the information he has brought back is of the most definite kind respecting the geography, the people, the natural resources, and the present political condition of the country. He tells us that, in the wide distribution of coal, China is one of the most favored countries upon the earth. Her coal-fields cover 400,000 square miles, and yet not a single mine is worked. Her supply of iron, moreover, is inexhaustible, and she smelts very little. If we had a few more such explorations, we would know something of China.

Dr. Martin, the physician of the French legation at Peking, has written a paper upon the population, geographical position, and climate of Peking. His conclusion respecting the population is, that it has been greater than it is now; that it has decreased during the present dynasty; that it has never been so great as has been commonly supposed in Europe; and that it now consists of between 800,000 and 900,000 Chinese, 35,000 Mahometans, and about 200 Europeans. I may add that the Abbé A. David is exploring the province of Chen-Si.

We have now a definite account of the interesting journey to which I referred in my last address, of Mr. Fedchenko, the Russian traveller, from Khojend to the source of the Syr Daria, or Jaxartes, embracing the exploration of the Alai range of mountains,—a journey of much geographical importance. It has fixed the position of the watershed between the Syr Daria and the Oxus, and led to the discovery of the northern source of the Oxus and the gigantic Trans-Alai Mountains, behind which is supposed to lie the Pamir Steep, which Mr. Kennan, who read before us the interesting paper on the Caucasus last month, hopes at some future day to explore. Mr. Fedchenko heard that the plateau of the Pamir Steep is a very extensive plain, so high and with the air so rarefied that the Kirgheez cannot live there. It is deeply to be regretted that this distinguished traveller and naturalist, after surmounting all the perils and trials of this journey, lost his life last summer in the glaciers of Switzerland.

The Russian campaign of this summer, which has culminated in the capture of Khiva, has produced and will continue to produce most important geographical and political results. The letters of Mr. J. A. MacGahan, the *Herald* correspondent in Central Asia, have furnished valuable and accurate information as to the nature of these changes, the most important of which is the addition of the right bank of the Oxus to the Russian dominions, embracing

the country north of that river, east of the Sea of Aral. Forty thousand slaves were liberated in the conquered territory, and slavery there and in Bokhara has been abolished. The provision abolishing slavery is said to have been a suggestion made by our corresponding member, Mr. Schuyler. The treaty made has abolished custom-houses, and has given free trade to the Russians, and also to them exclusively, with the Khivese, the free navigation of the Oxus.

The settlement by arbitration of the districts which have been in dispute between the Persian and Afghan governments, which necessitated surveys by engineers; the geographical labors in connection with it of Sir Frederick Goldschmidt, and the exploration and observations of Mr. W. T. Blanford, have added something to our knowledge of the geography of Persia. The results of the exploration warrant the opinion that Persia was anciently a more fruitful and productive country than at present; that it has undergone a change from a moister to a drier climate; and that as the rainfalls diminished, lakes dried up, leaving desert plains. Mr. Blanford says that, from this cause, the plateau of Persia is a series of desert-plains, from no portion of which is there any river; the rain which falls being absorbed or evaporated. The greater part of Central Asia from the Caucasus to Thibet, he says, closely resembles Persia in its physical character; and the conclusion of Sir Henry Rawlinson is that unless means be found to collect the water from the mountains and utilize it in irrigation, there are no hopes for Persia.

Among the most important of recent geographical explorations is that of Mr. Jacob Halévy in the southern part of the Arabian peninsula through the interior of Yemen, a country little known, and where travelling is perilous. His journey extended from Hodegeda, on the Red Sea, in a north-easterly direction through the Wadi Habouna, 18° 55' north latitude. The first civilization in Arabia was developed in Yemen, and was the work of a people who were not nomadic, but who were attached to the soil, and who believed in a plurality of gods. It was to study the monuments, ruins, and inscriptions of this ancient Sabeen civilization that this perilous journey was undertaken, which involved an examination of the geographical features of the country, the ruins of ancient cities, and of interesting monuments, from which Mr. Halévy has brought back 686 inscriptions. On several occasions he owed his safety to being an Israelite, the inhabitants being comparatively tolerant to those of that religious persuasion, especially in Djaouf, east of Cana.

In this part of the country he found many Sabean inscriptions, and saw the source of the river Kharid, which runs toward the interior of Arabia, and disappears after fertilizing the numerous oases of the Djaouf. He believes this to be the river which is alluded to in a passage of Strabo as having been crossed by the Roman army of Ælius Gallus, in his expedition to the country of the Sabeans. Innumerable ruins in a crumbling condition, he says, cover the soil on the banks of the Kharid and its affluent, the Medheb.

EXPLORATIONS IN PALESTINE AND SYRIA.

The surveys and explorations in Palestine were prosecuted last year under the auspices of both the English and the American society. The American society has but entered upon its labors. As those of the English are very nearly ended, and as I have hitherto said but little respecting this interesting exploration, it may be appropriate now to give some account of what the English have done. I shall begin with the excavations in Jerusalem carried on by Capt. Warren, to ascertain the ancient site and plan of the city and fix the locality of places of Biblical and historical interest. It was a work of difficulty, in which the explorers ran much personal risk, besides being hampered by the nature of the permission given, which forbade exploration in places sacred to Moslems or Christians, the very places in which it ought to have been made.

The details of this work, which occupied nearly three years, are too numerous to enter upon. Shafts were sunk below the present city in various places to a considerable depth; and discoveries were made of extensive subterranean passages and galleries, winding aqueducts and canals which were cut in the solid rock, chambers, drains, sewers, wells, and tanks. A stream of running water was found, showing that a fountain exists far below the surface and is still running, — a circumstance of interest, as there is now a dearth of water in Jerusalem. Inscriptions in the Phœnician characters in red paint were found upon walls, and many objects of interest were gathered, such as lamps, pottery, weights, seals, gems, and sepulchral chests — some of them very beautiful — containing human remains. An attempt was made to determine the exact position of parts of the Temple, and the site of Solomon's Palace; but while the investigations have had the effect of disturbing many of the previous theories as to the precise locality of places, they have not been sufficiently certain to remove doubts, or to dispense with further inquiry. Much has certainly been added to our knowledge

of the ancient city ; but it must be admitted, in view of the time, labor, and money that have been expended, that the results have not been so great as were expected.

Before these excavations were begun, Capts. Wilson and Anderson, in the interest of the Society, made a reconnoissance-survey, with occasional excavations, from Beyrout to Damascus ; thence to the Sea of Galilee, and then south through Galilee to Jerusalem. Between Beyrout and Damascus, astronomical observations were taken and plans made, with occasional drawings of temples and basilicas. After leaving Damascus, they made their way to the waters of the Upper Jordan to Laisha, the Dan of the Bible, examining the river and its tributaries. They visited Hunin, a place of which nothing is known, though there are there the remains of a vast fortified place so old that "it bears the stamp of every successive conquering race". Farther south they explored Kedes (the Kedesh Naphtali of Scripture), one of the ancient cities of refuge, making excavations among the ruins, and taking photographs ; also Jebel Jermuk, the highest mountain in Galilee, 4,000 feet above the Mediterranean, on the top of which, never before visited, they found an inhabited village, the people of which would give no account of themselves. Among other places examined was Meinon, the most venerated place in Palestine, as it contains the tombs of the great rabbies Hillel and Shammai. Their exploration of the shores and their survey of the Sea of Galilee were exceedingly thorough, and have resulted in the most complete map that has ever been made of that interesting locality ; and with their tracing of the watershed and sources of the Jordan were connected excavations at Gerizim, the ancient Schechem, which was known before Jerusalem was in existence.

This is but a very limited statement of this interesting reconnoissance. It has settled disputed questions, determined astronomically the position of many places, gathered materials for the elucidation of ancient history, and added much to our knowledge of the topography of the region traversed. Capt. Anderson says, that, in the vast system of the valleys of the route they followed, there is not a hill-top on the ridges between that does not contain the ruins of some ancient city ; that the land is undergoing change ; that the people are dying out or migrating ; that the old habits and customs are disappearing ; and that if researches are to be made in exposition of Biblical history, they must be made now, ere the levelling hand of civilization shall have effaced the relics of the past.

During the three years that the explorations in Jerusalem were in progress, Capt. Warren made several reconnoissances into the interior. The first was to the plain of Philistia, lying between Judea and the Mediterranean, the land of the ancient Philistines, where he found a fertile soil neglected, the very existence of which is threatened by the sand that is gradually advancing upon it. One of his objects was to ascertain the site of the City of Gerar, where Isaac had lived, but he failed to find any evidence of it. He visited Gaza, one of the most ancient cities in the world, which was in existence in the time of Abraham, and fixed the site of the ancient city as nearer to the Mediterranean than the present one, which is three miles from it. He also made researches in the country about Ascalon. His next reconnoissance was in the comparatively unknown region east of the Jordan, where he fixed the latitude and longitude of many places, and took a great number of photographs of ruins, temples, tombs, etc. It is a country of ruins. They are, he says, everywhere. Over a tract of four miles square there was a never-ending succession of ruins. On every rising ground there had been a village; on every hill-top, a temple. He found in the pointed arches, proof that a domesticated people lived here after the fall of the Roman empire. It is now occupied only by the Bedouin. His visit was too short to enable him to accomplish much. The region is the one now undertaken by the American society. His third expedition was an exploration of the Jordan, in which he went up one bank of the river, and returned by the other, making geographical observations especially with reference to further surveys. His last reconnoissance was in Lebanon, and was chiefly devoted to the sketching and measuring of temples, and the examination of Mount Hermon, of which an elaborate investigation was made.

The next important undertaking was the survey of the peninsula of Sinai, under the direction of the British Ordinance Survey. The conclusions arrived at by those engaged in this exploration and survey are: 1. That this peninsula was the scene of the events recorded in the history of the Exodus, and its examination has certainly furnished a remarkable corroboration of the truthfulness and accuracy of the Biblical history. 2. That the country is extremely wild and rugged; that it has one of the most complicated systems of drainage in the world; and that the present barrenness and desolation are due to neglect; that formerly it was well wooded, its mountain-sides terraced with gardens, its rushing waters regulated and utilized, and

that this fertility lasted until comparatively modern times. 3. That Jebel Musa is undoubtedly the mount from whence the law was delivered; its form, position, and the surrounding plain indicating unmistakably that it was here that the multitude assembled to listen to the words of Moses. This last conclusion is disputed by the learned Dr. Beke, who says that Mount Sinai is farther to the north-east, in the desert in the vicinity of the Gulf of Akabah, and he is now collecting a fund in England to enable him to go out and search for it. He argues that Mount Sinai, from the account of it in the Bible, must have been an active volcano in the time of the Exodus, which he thinks is now extinct. Mr. A. L. Rawson, who is present, tells me that he made three trips across this desert in 1852-1853, and that there are no indications of volcanic action in the quarter referred to by Dr. Beke. The geological specimens collected by him in these two journeys are in the Museum of the Central Park in this city.

The Desert of the Exodus—in which the Israelites wandered for forty years, which lies between the peninsula of Sinai and Palestine, now known as the Desert of Tih—was explored by Prof. Palmer and Mr. Drake. They found it a country nearly without water, the solid ground covered by flint so worn and polished as to resemble black sand, with a considerable distribution of a brown, parched herbage which bursts into life in the spring, but is dry and dead during the greater part of the year. In the southern portion of this desert, stone circles and cairns were constantly found, indicating the former existence there of an extensive primeval population. After this desert is passed, that is in the hill-country south of Palestine, the primeval stone remains of a prehistoric race were found; and the fenced enclosure, also, of a pastoral people, supposed to have been the Amalekites, who lived here in the time of the Exodus. Further north were the ruins of once populous cities, the seats of civilization and culture; but the incursions of armies, the stopping-up of wells, the destruction of trees and of works for irrigation, have left the country a scene of desolation. The Arabs who now inhabit it are among the wildest and most intractable of the Bedouin tribe. Half of the desert is the work of these Bedouins, who will not labor, but live by plunder; and it is due to them that many a fertile plain, once occupied by an industrious people, is now a barren wilderness.

The explorers may be said to have traced with approximate certainty the path of the Israelites in their journey to the Promised

Land. The whole country traversed was carefully examined, and abounded in ruins of cities, fortresses, mounds, churches, wells, rocks, dwellings, etc.; with spots of great fertility and cultivation, others waste and desolate; many places still retaining the names they had in the days of David.

This exploration was made by Messrs. Palmer and Drake on foot for a distance, in one direction, of 600 miles, without attendants, the explorers doing everything for themselves, dressed in the garb of the country, and speaking the language of the people. After reaching Jerusalem they again went southward to complete their examination of what is known as the south country. From thence they explored Edom, the country lying between the Dead Sea and the Gulf of Akabah, which they found a fertile land, fully justifying Isaac's prophecy to Esau, and which, but for the curse of the Bedouin, might, they say, become one of the most wealthy, as it is one of the most picturesque, countries of the world. They then passed northward into Moab, finding everywhere signs of its former wealth and cultivation, exploring the country, and examining many ruins, and practically closed their labors standing upon the mountain where Moses for the first time looked upon the Promised Land. The portion of the country traversed by them—of which, so far as known, they were the first explorers—was the portion between Wady and Ghamr and Wady Maderah, about fifty miles. The other parts of their route have been passed over by different travellers, among others by the late Dr. Robinson, of this city. This expedition has added to our knowledge of the geography of the region visited, and has confirmed, in a remarkable degree, the accuracy of the Biblical topography.

The operations which are now going on consist, first, of the survey of the whole of Palestine between the Mediterranean and the Jordan, by Capt. Stewart, R. E., and his assistants, under the direction of the English society. About 1,600 square miles had been surveyed up to last summer; and, as the survey is steadily proceeding, it is now, of course, largely extended. With this survey is connected a searching archæological investigation. A geological map of the country is to be constructed, and a collection is being made of botanical and zoölogical specimens.

By an arrangement with the English society, the survey of the country lying east of the Jordan and of the Dead Sea has been undertaken by the American Palestine Exploration Society. It embraces the part of Palestine which is the least known, and is in territorial

extent three times as great as the country surveyed by the English. It abounds in ruins, inscriptions, and objects of great interest; and its exploration will undoubtedly throw a great deal of light upon Biblical history, as well as upon the former history of the country lying midway between Assyria and Egypt; the region to be explored being what was formerly the principal highway between these two great ancient civilizations.

It was here that the Moabite Stone was found, the interest of which is not alone the record of long-past events which is inscribed upon it, but the fact that it sheds more light upon the invention of our alphabet than anything before discovered. In the language of the late learned Mr. Deutsch, "it illustrates to a hitherto unheard-of degree" the origin and history of the art of writing as we possess that priceless inheritance.

The American expedition, as I stated in my last address, was placed by the American society under the command of Lieut. Steever, U. S. A. Lieut. Steever spent about five months in explorations east of the Jordan. He has surveyed about 600 square miles, and has prepared a very valuable map. The explorations were in Edom and Moab. Various sites have been satisfactorily identified, and the positions of Mount Nebo and Pisgah determined. The levels of many important spots were taken, a number of ruins in Moab examined, and interesting inscriptions copied.

There is frequent mention in the Bible of Gezer, in the land of Canaan, a very ancient city which was in existence before the Israelites entered Egypt. It had hitherto been sought for in vain, but during the past year Mr. C. Ganneau, to whom the world is mainly indebted for securing the fragments of the Moabite Stone, succeeded, through a reference in an Arab chronicle, in discovering its site, which corresponds admirably with the topography given in the Bible. The ruins show a large and ancient city, occupying a vast plateau on the summit of Jeb Azar, which is about half-way between Jerusalem and the Mediterranean. He was able to trace in part the plan of the old city and the position of the houses and suburbs. On one side were quarries of considerable size, from which stones had been taken for the city, and beyond were many tombs excavated in the rock.*

* Mr. A. L. Rawson here stated that he discovered Gezer on the same site in 1852, and made a sketch of it; that it will be found to be so located upon the map of Palestine which he published in this city in 1856.

The Rev. Samuel Jessup, an American missionary, has recently given an account of the ruins of Husn Sulayman. They lie in a secluded spot in the heart of the Nusaireeyeh Mountains in Syria, two days' journey from Tarabulus, or Tripoli, on the Mediterranean, of which ruins hitherto but little has been known. The name denotes the stronghold of Solomon; but the principal enclosure has not the situation or appearance of a fortress, for this beautiful ruin is seen from the summit of the mountain-ridges which nearly encircle it, lying below in the centre of a little basin, and may have been a summer-palace of some forgotten Syrian ruler, or else a sacred enclosure erected in this secluded mountain-top for the worship of the Sun. The latter supposition is probable, for the carving as well as the style of the building, which is built of huge blocks of a yellowish-gray limestone, taken from the adjoining mountain-side, resembles the Temple of the Sun at Baalbec. The carving is chaste, and the entire structure grand and impressive. "It has remained here," says Mr. Jessup, "for many ages, almost never disturbed by any intruder." His article, with engravings of the ruins, is published in the second statement of the American Palestine Exploration Society.

Mr. A. Johnson has recently visited the people who dwell in the mountains which connect the Taurus with the Lebanon range, and lie along the Syrian coast. This strange people, he thinks, are the descendants of the ancient Canaanites, who, driven by successive conquerors from their former homes, found a secure refuge in these dark mountains. Their religion is a mixture of the worship of Baal; of Astarte, the Phœnician Venus; of fire; of the heavenly bodies, and of Mahometanism and Christianity, with traces of the Jewish law,—all strangely blended. The tribes are allied, but not at peace, for the practice of blood-revenge is universal, and produces the same disastrous consequences as in the Caucasus, and other parts where this barbarous custom survives. Mr. J. found them an interesting people, the men and women, unlike Eastern communities, mingling freely together. He took measures of the mountain-heights reached by him, and gave some attention to the geography and geology of the region. Prof. J. Strong left this city last December at the head of an expedition for explorations in Palestine, Syria, Asia Minor, and Greece, which, it is said, are to be geographical and archaeological.

I mentioned last year the various plans for a line of railroad to connect London with India. The line recently surveyed by Messrs.

Low and Thomas is to make use of the existing lines of the Mont Cenis Tunnel to Trieste, and thence through Austria, European and Asiatic Turkey, Persia and Beloochistan, to Kurrachee, and thence to Bombay; making the whole journey from London in about five and one-half days. Its course from Constantinople would be to Adalia, on the Mediterranean; thence along the coast to the port of Iskanderun (Alexandretta), in Northern Syria; from thence it would take a south-easterly course, proceeding along the Valley of the Euphrates, to the western extremity of the Persian Gulf, and following the shore of the Gulf and the Arabian Sea to Kurrachee. M. Lesseps, whose name and fame will be forever identified with the Suez Canal, proposes a different route, — viz., from Oreuburg, at the dividing line between Europe and Asia, to Peshawur, the northern terminus of the railroads of India; by which route, he says, a traveller could go from Calais to Calcutta in six days.

Mrs. Burton, the wife of the distinguished traveller, who, with her husband, has spent some time in examining the feasibility of routes through Syria, insists that to cross the North of Syria would be through a comparatively poor country, where the road would never pay its expenses; that it is also unhealthy; and that the true course is to carry the line to a more southern port than Iskanderun, before crossing Syria, and running it then through what would be the richest land in the country, where the climate is good. Strangely enough, the route which she insists as being now the most practicable is the old route of the ancients. Its point of departure would be from the site of ancient Tyre, now a thriving little town; and Baalbec and Palmyra would become stations. If this should take place, India and Europe would communicate as they did 2,000 years ago. If Tyre should now become a place of importance, and Baalbec, now the site of magnificent ruins, with about two hundred inhabitants, and Palmyra, now tenanted by about thirty mud cottages, should again spring into life, it would be among the railroad-marvels of the age.

AFRICA.

The geographical intelligence from Africa during the past year is varied, but not so interesting as the previous year's. It embraces the progress of expeditions, the return of some, the organization of others, and the efforts of individual explorers. A renewed interest has been excited in the gold and diamond fields of South Africa. The negotiations of Sir Bartle Frere with the Sultan of Zanzibar

for the extinction of the slave-trade upon the eastern coast has ended; and his effort, it is hoped, will diminish, if it do not extinguish, that infamous traffic. Mr. Kirke, the consul at Zanzibar, has examined the mouth of the Lufigi, a stream upon the East Coast, and transmitted an account of the result to the Royal Geographical Society. Dr. Nachtigal reached Wadai, the country where Dr. Vogel lost his life, from whence he travelled by Darfoor to Kordofan, reaching Khartoom near the close of the year, and is the first European who has communicated any information respecting Wadai. The East-African Expedition, for the relief of Dr. Livingstone, when last heard from, on the 24th of July, had passed Ugogo, and expected to reach Unyanyembi in a fortnight. They encountered many difficulties, and Lieut. Cameron, in the trying situations in which he has been placed, has proved himself a most efficient commander. Dr. Rohlfs, who made the journey through North Africa from Kutha to Lagos, has by this time probably started upon an expedition, at the expense of the Viceroy of Egypt, for the exploration of the Lybian Desert, having with him a botanist, a geologist, and a geographer; and Dr. Hildebrand, a German botanist, has undertaken an expedition to East Africa, from which important results are anticipated.

The return of Sir Samuel Baker is exceedingly gratifying, the greatest interest having been manifested in this country for his personal safety, and the deepest sympathy felt in the success of his expedition for the suppression of the slave-trade in the regions of the Upper Nile. It would be premature to state positively the results of this great enterprise, for they can only be ascertained when the great basin of the Nile shall have actually become one Egyptian province.

The difficulties which he encountered were in no way owing to him, but to the intrigues of the ivory and slave traders, with whom the Turkish commander had fraternized. The Governor-General of the Soodan was also opposed to the expedition, and did not execute the orders he had received; so that when Baker arrived there, in 1870, he found neither vessels, men, nor provisions ready. An impassable barrier, moreover, had formed at the mouth of the Bahr-el-Ghazel, by which he was delayed there ten months. His provisions were exhausted, and the promised supplies from Khartoom did not arrive; so that he could not reach Gondokoro until the end of 1870, and when he did, the overland transport of steamers, etc., that he had contemplated could not be effected, and he was left to pursue his

operations with but 200 men, a part of his equipment. The subsequent details, the efforts to poison his men by the chief Kabrega, the murder of his messenger, the surprise of his camp, his successful escape and retreat, his alliance with Kiongo, the attempt of Abu Saut, at Fatiko, to have him killed, and finally his organization of a government over the vast district of Fatiko, and the good effects it produced, show the indomitable perseverance, courage, and capacity he exhibited. Mr. M. L. Hansell, our corresponding member at Khartoom, writes to our General Secretary, September 17th, 1873, that if the transportable steamers, now at Gondokoro, could be brought beyond the cataracts and used for exploration on the Nyanza, it would lead to important, scientific, political, and commercial results. He also says that the trade in ivory does not pay its expenses, and is simply a cover for the slave-trade. He advises us that Mr. Marno attempted to force a passage for his vessels in the marshy region of the Bahr-el-Ghazel, and, after being detained there for six months, came back to Khartoom, and that he has returned to Europe.

Mr. Miani, the celebrated Italian traveller in Africa, a native of Venice, from whom we received a most interesting communication some years ago, undertook a journey of exploration south-west of the White Nile, and partly through the country first visited by Dr. Schweinfurth, with the design of reaching and exploring the western shores of Lake Mwntan-Nzigi (the Albert Nyanza). On the 9th of this month, we received a letter from Mr. Hansell, written by him at Khartoom, conveying the sad intelligence of Miani's death, which occurred in the Monbutta country, October 21st, 1872. Miani was a white-bearded, patriarchal-looking man who had spent the best years of his life in Africa, and he travelled further *up* the Nile, following the river, than any other white man. At the farthest point he reached, in sight of Apuddo (latitude $3^{\circ} 44'$), he cut his name in bold Roman characters in the bark of a tamarind-tree which Speke and Grant discovered on their walk across Africa. Miani unfortunately became involved in controversies with Speke, Grant, Baker, and other English travellers which did not place his extraordinary devotion and great experience as an African explorer in the happiest light before the European societies. But where he was known, this venerable Italian was respected for his modest and quiet demeanor, and for the honest enthusiasm and fearlessness with which he carried out his daring enterprises.

M. Beysseance, an experienced French traveller and naturalist,

is about to explore the unknown country between the basin of the Nile and the Ogowai and Shari, including the Albert Nyanzi; and Munzinger Bey has made explorations in Takka and Bogos.

On the North-African coast, Capt. Moucher, in the *Narval*, has been making hydrographic explorations, especially in the vicinity of Algiers; and H. D. Lacaze Dutiers has been dredging for the examination of the fauna of the Mediterranean. Gen. Gallifet made a military reconnoissance into the Desert of Sahara, during which, geographical notes were made, and from the marks of erosion and the distribution of boulders it was thought there was evidence over that desert of past glacial action. MM. Soleillet and Vignard are about to proceed from Algiers for the scientific study of a part of the same great desert. M. C. Tissot has traversed certain parts of Morocco, and made most interesting discoveries, among which are Banasa, a city founded by Augustus and described by Ptolemy, but the site of which has heretofore been unknown. Mr. Tissot traversed the whole line of the Atlas Mountains, and, from the information gathered there and elsewhere, thinks that he will be able to fix the Roman itineraries in Morocco. M. Duveyrier has submitted to the French Geographical Society a very full statement of the explorations of the French south of Algeria, from 1859 to 1872, which comprises a large amount of geographical details, scientific observations, and linguistic researches, derived, in a large degree, from his own explorations, as well as from the labors of others. He speaks of a race of Berbers in the Sahara called Imolagh, who are white, and by whom the custom of the sex is reversed. The men wear veils, and not the women; and the man, he says, would consider himself dishonored if he exposed his face, and, therefore, wears his veil at all times, walking, riding, or sleeping. They treat their women with great respect. The women alone are acquainted with the art of writing, and exercise, he says, a great influence in politics. I can only regret that my limits forbid an extended account of this most interesting communication.

On the West Coast there has been great activity. We have the account during the year of an expedition by Prof. Blyden to Falaba, a country of the interior, lying north-east from Sierra Leone, which was very little known. The journey was made with great difficulty, each petty tribe exacting contributions from every one that passes through its territory, which here, as in other parts of Africa, is a barrier to all commerce with the valuable countries in the interior. Falaba was found to be a land of extensive and fertile plains; both

it and the countries about it having vast agricultural capacities. The people were orderly, well-fed, well-clothed, and very desirous of intercourse. It is also a gold-bearing region, and in certain parts the gold is said to be abundant.

MM. Compeigne and Marché have undertaken to penetrate Equatorial Africa in the vicinity of the Gaboon. Their object was to trace the course of the Ogoone, and the lakes to which it is supposed to lead, one of which is reported to be a very large one. The last accounts of Lieut. Gandy, the commander of the West-African Livingstone Expedition, is, that he left San Salvador, the farthest point in the Portuguese dominions, for the country east, which is nearly a blank upon our maps. A German expedition, organized by Dr. Bastian and the Berlin Geographical Society, left last spring for the exploration of Loango. The Doctor and his associates passed some time on the coast gathering information and preparing for this important expedition, in the course of which they made several excursions. The information they had received led them to believe that after a three weeks' journey from the coast they would reach an open country with metalliferous mountains, where a people dwell who understand the manufacture of gunpowder; and that a great river is there spoken of by the natives, variously called the Congo, Bongo, and Lualali. They are confirmed in their belief that they will find an indigenous race of dwarfs similar to those seen by Du Chaillu, several specimens of this type having been met with upon the coast. They are called Obongo, Babongo, or Vambutu; but Dr. Bastian declares their proper name to be Bari or Bali. The Doctor went up the Congo to Embomma, to ascertain the truth of the report about Dr. Livingstone, or that a white man had been seen approaching the coast, and learned that there was no foundation for it. The Doctor has returned to Germany, and the expedition, I suppose, has started for the interior.

Besides the explorations which are the special object of expeditions and travellers in Africa, it should be remembered that there are hundreds of residents living on the coast, or having trading outposts in the interior, who are annually contributing a rich fund to geographical knowledge by correspondence or publications. A corresponding member of this Society, Dr. Albert Bushnell, is living at the Gaboon, near the equator, who supplies us with valuable letters. Herr Hansell lives at Khartoom, the junction of the Blue and White Niles, and is a corresponding member who takes an active interest in our Society. Munzinger Bey, one of the ablest

geographers and most experienced travellers, the first authority on Abyssinia, is our corresponding member at Massowah. I should not pass without remark the warfare going on in different parts of the African continent. Violence and bloodshed are chronic in almost every latitude of that continent. From the Fellahine of Egypt, in the upper provinces, who often revolt against the authority of the Khédivè; through the deserts roamed over by the restless Bedouins; over the great central plateaux, where flow the headwaters of the Nile, down to the Cape of Good Hope, thousands of lives are annually destroyed, because civilization would seem to have turned her back on Africa. The Ashantee war, which is now being prosecuted with vigor by Sir Garnet Wolseley, aims at the reduction of a people, one of the bravest and most energetic under the tropical sun. Whatever may be the grievances of either party to the conflict, the conquest of Ashantee with its 3,000,000 of population, whether it means permanent annexation to the British colonial empire or not, will be considered in the hereafter of history as a movement that was begun not a moment too soon, and prosecuted with a devotion not a degree too intense.

AUSTRALASIA.

Capt. Morsby, of the Royal Navy, of Her Majesty's ship "Basilisk", has explored a portion of the shore of New Guinea to the east end of the island, embracing the coast and islands in Torres Straits, which was connected with important surveys. The details of this valuable work are too great for me to enter upon. Contrary to the impression previously entertained, he found the people, who are a copper-colored race, friendly and intelligent; very superior to the black races of other parts of New Guinea. He found them, like the Malays, living in houses erected upon poles, and they were acquainted with the art of making pottery. He says they are a pleasant and genial race of savages, slightly addicted to cannibalism. Capt. Morsby is of opinion that the route between China and Australia will be hereafter through the China Straits, as they are free from danger, and safe anchorage can be found anywhere. He examined a portion of the northern shore of New Guinea for about twenty-five miles in his boat, and found it washed beyond East Cape by a clear reefless sea; the shore enclosed by a coral-wall, along which a ship may sail in safety, and find good anchorage in any of the bays where a beach is seen. He speaks in high terms of the beauty and fertility of this part of New Guinea; a great variety of

products grows in the valleys, and many of the mountains are cleared and terraced to their summit with plantations. Mr. Macfarland is about to proceed to New Guinea in a steamer supplied by Miss Baxter, of Dundee. He proposes to visit both sides of the eastern peninsula; to carefully examine them for a mission-station, to collect geographical information; and he anticipates that, eventually, the more healthy region of the interior mountains will be reached.

Signor Beccari, the Italian naturalist and traveller, has continued his explorations in New Guinea but with indifferent success, and he writes unfavorably of the climate. His recent explorations have been in the Aru Islands, where, he says, no venomous animal is found; but in the surrounding seas there are poisonous fish. He writes somewhat despairingly of his efforts, and says that these islands are as unhealthy as New Guinea.

In March last, Dr. A. B. Meyer, with a small schooner, went to Dorey, a missionary settlement on the north-west of Geelvink Bay, in New Guinea, for the exploration of that island; his principal object being to cross this great island, if possible, from east to west. The prevalence of the east monsoon after his arrival prevented his making the attempt then, and he passed some time in exploring the islands in Geelvink Bay of Mysore and Jobi, in the latter of which he spent some time making researches in natural history. He returned to the Island of New Guinea, and finally succeeded in crossing it, which had never before been accomplished. On the south-west, the island is indented by a deep gulf (McClure Gulf), extending far into the interior in the direction of the great Geelvink Bay on the north-east side; the space between the two being the narrowest part of this great island. It was across this space from Geelvink Bay to McClure Gulf that Dr. Meyer's journey was made, which has established what was before unknown,—that there is no communication by water between the gulf and the bay. The journey was a perilous one, as the coast Papuans in nearly every part of New Guinea are in perpetual war with the mountain-tribes. Dr. Meyer's impressions of the natives and of the country are more favorable than those of Beccari, and he had better opportunities for observation. He ascertained that some of the mountain-tribes on the north coast, on the coast of Geelvink Bay, and in the mountains of the Island of Jobi, are cannibals; the Papuans, however, whom he encountered, though at first hostile, were afterwards friendly; and he describes the natives generally whom he saw as having all

the virtues and vices of savage races. He made large collections in natural history, and says that the Dutch have taken possession of the western half of the island, but that the whole eastern half is free for any nation to colonize.

Mr. J. Thompson and Dr. Maxwell penetrated to the great mountain-ranges which traverse the Island of Formosa from north to south, and found it occupied by a robust, erect, well-built race of savages, of aggressive disposition. The explorers ascertained that coal is widely distributed over the island, and that the central mountain-range is richly wooded.

It would be premature to speak now of the results of the Dutch expedition for the reduction of Acheen. Indeed, that important movement, like the Khivan and Ashantee campaigns, concerns us only in so far as it changes the political geography of the portion of the globe where it is operating; and thus far there has been no result.

Mr. Ernest Giles and Baron von Müller have been engaged in exploring Central Australia, west of the Transcontinental Telegraph Line, and have gathered a great deal of accurate geographical information. They found a great salt marsh, or lake, 120 miles long. Tin-ore has been found in Queensland in great mass, a most valuable discovery; and extensive beds of hematitic iron, in connection with both coal and limestone, have also been recently discovered in Australia.

The telegraphic event of the year has been the completion of a line of telegraph across the entire extent of Australia, from south to north; that is, from Adelaide, in the south, to Port Darwin, in the north, a distance of 2,012 miles. The line of this telegraph will be nearly indicated upon the map of Australia by the delineation to be found there of the route traversed by Stuart in 1862,—a route, however, so imperfectly known, that the engineers engaged in the work had, in fact, to be explorers. The work was one of great difficulty, being impeded by the tropical rains, the decimation of animals, and other impediments. The geographical results are, that there is generally in the interior abundance of pasturage and water. The climate is good, the soil fertile, and the greater part of the country is well adapted for raising cattle and growing corn. The completion of the telegraph across Australia gives a line from Adelaide to Gibraltar of 12,462 miles, of which 9,146 miles are submarine. The practical result is, that Australia now receives news three weeks earlier than the latest brought by the mail steamers. The last geographical intelligence from Australia, received yester-

day, is the discovery by an expedition despatched by the government of Queensland, of thousands of acres of the richest sugar-growing lands, in the vicinity of the coast north of Cardwell, in which two new species of the banana were found, and a large addition made to the flora of this portion of Australia. As this discovery was on or near the line of the mail route to be established to Torres Straits, this new land will be rapidly settled, and with this remote and last civilized portion of the earth I will take leave of the geographical work of the world in 1873.

MR. SAMUEL B. RUGGLES, in rising to propose a vote of thanks to Chief-Justice Daly, said:

I feel well assured that I do but express the unanimous feeling of this large and intelligent audience with the very interesting, comprehensive, and exhaustive address of our President, to which we have all listened with so much pleasure and instruction, when I move to tender him a vote of thanks, and that this able document be published in an enduring form. In doing so I cannot omit the opportunity of calling attention to one of its particular effects in falsifying the assertion of a very distinguished English statesman and writer, Edmund Burke, that the profession of the law has a tendency to narrow and belittle the human intellect; for, here we find the Chief-Justice of one of our large and important courts in this great metropolis not only discharging his juridical duties with signal ability, but finding time and the inclination to embrace this great physical world of ours in his grasp; to watch all its varying processes; to take it into his hand, so to speak, as its custodian; and, annually, to make report of its condition and development; covering within his survey all the lands and all the seas within the reach and knowledge of civilized man. For one, I feel myself, as a citizen of this vast nation forming so considerable a portion of the globe, deeply obliged and indebted to the distinguished gentleman for his thorough and well-directed efforts to elevate and sustain the scientific character of our country in this grand and liberalizing field of human thought and action. The judicial tribunal over which he so well presides as its Chief-Justice, so far from belittling or dragging him down, is itself elevated and dignified by his admirable efforts in this larger sphere of scientific study and research.

The motion, which was seconded by the Rev. William Adams, D. D., in a felicitous speech, was applauded and adopted unanimously.

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day, is the discovery by an expedition despatched by the government of Queensland, of thousands of acres of the richest sugar-growing lands, in the vicinity of the coast north of Cardwell, in which two new species of the banana were found, and a large addition made to the flora of this portion of Australia. As this discovery was on or near the line of the mail route to be established to Torres Straits, this new land will be rapidly settled, and with this remote and last civilized portion of the earth I will take leave of the geographical work of the world in 1873.

MR. SAMUEL B. RUGGLES, in rising to propose a vote of thanks to Chief-Justice Daly, said:

I feel well assured that I do but express the unanimous feeling of this large and intelligent audience with the very interesting, comprehensive, and exhaustive address of our President, to which we have all listened with so much pleasure and instruction, when I move to tender him a vote of thanks, and that this able document be published in an enduring form. In doing so I cannot omit the opportunity of calling attention to one of its particular effects in falsifying the assertion of a very distinguished English statesman and writer, Edmund Burke, that the profession of the law has a tendency to narrow and belittle the human intellect; for, here we find the Chief-Justice of one of our large and important courts in this great metropolis not only discharging his juridical duties with signal ability, but finding time and the inclination to embrace this great physical world of ours in his grasp; to watch all its varying processes; to take it into his hand, so to speak, as its custodian; and, annually, to make report of its condition and development; covering within his survey all the lands and all the seas within the reach and knowledge of civilized man. For one, I feel myself, as a citizen of this vast nation forming so considerable a portion of the globe, deeply obliged and indebted to the distinguished gentleman for his thorough and well-directed efforts to elevate and sustain the scientific character of our country in this grand and liberalizing field of human thought and action. The judicial tribunal over which he so well presides as its Chief-Justice, so far from belittling or dragging him down, is itself elevated and dignified by his admirable efforts in this larger sphere of scientific study and research.

The motion, which was seconded by the Rev. William Adams, D. D., in a felicitous speech, was applauded and adopted unanimously.

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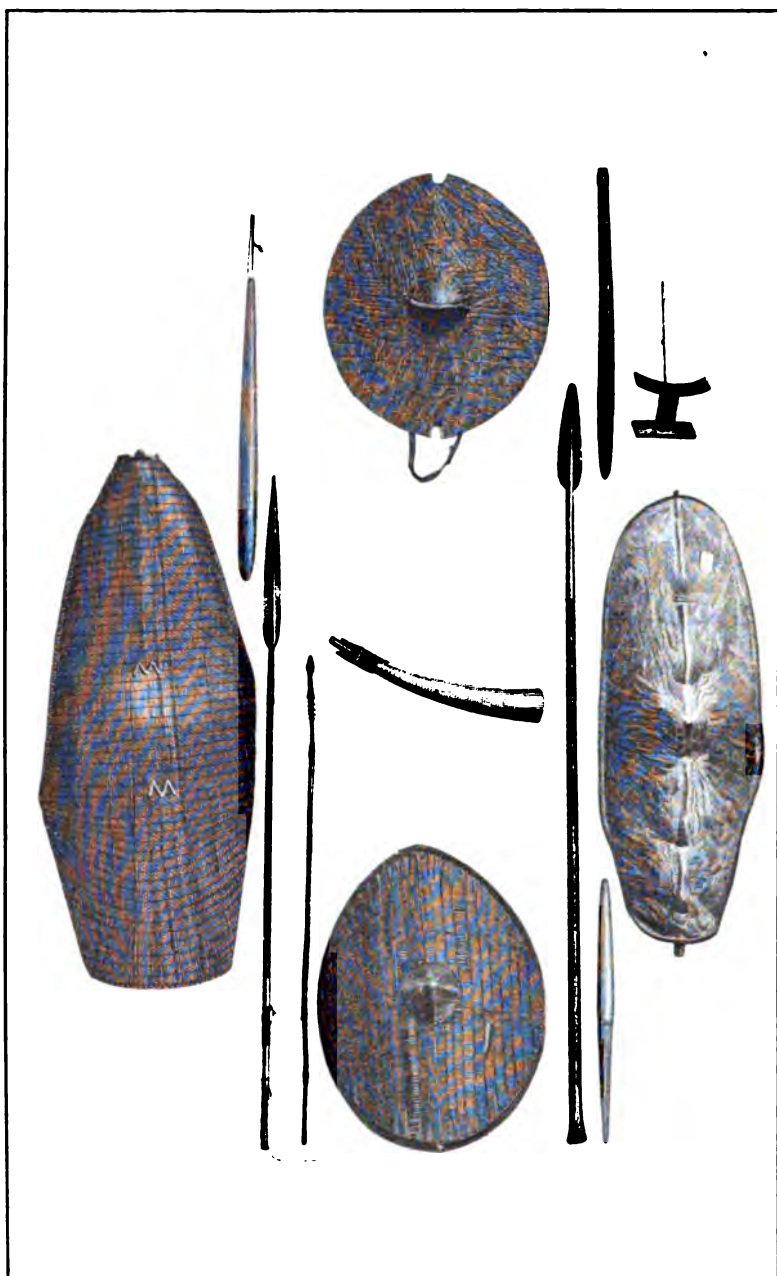
THE SOUDAN AND THE VALLEY OF THE WHITE NILE.

BY ALVAN S. SOUTHWORTH.

READ MARCH 25TH, 1878.

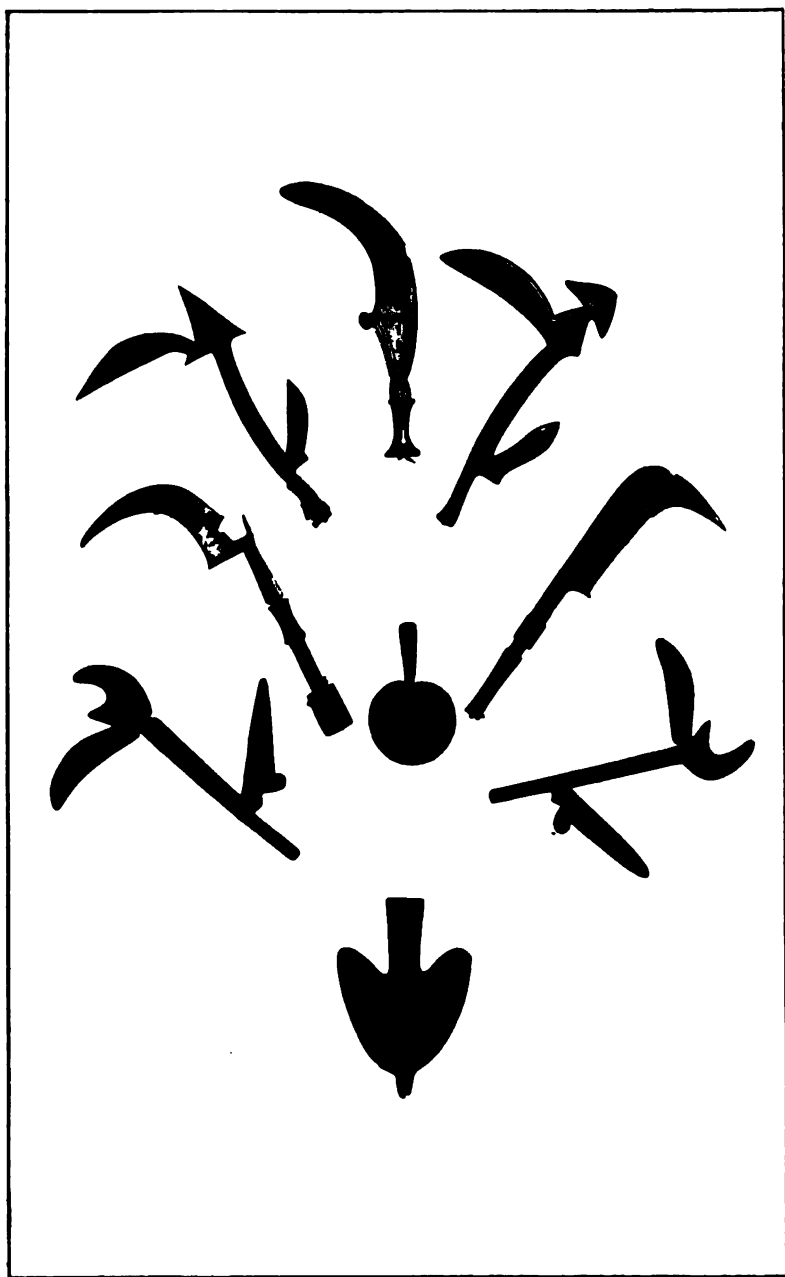
MR. PRESIDENT, LADIES AND GENTLEMEN,—As a correspondent of the *New York Herald*, and with the object of joining the expedition of Sir Samuel Baker, and of exploring the Upper Nile countries, I sailed from Cairo December 27th, 1871, and reached Khartoum on the 6th of February. Before entering the Nubian Desert at Korosko, the ascent of the Nile was simply a prolonged feast on board the “Dahabeah”, with the panorama of imposing temples and gigantic ruins relieving the dreary monotony of the river-banks. The valley of the Nile, from the first cataract where the stream ceases to be navigable, to Cairo is remarkable alone to the traveller for its vast structures and mausoleums. The *sikeahs* and *shadofs*, which are employed to raise water from the river in order that it may be used for irrigation, suggest that no improvement has been made in Egyptian farming during 4,000 years. But the smoke curling away from tall chimneys, and the noise of busy machinery in the midst of extensive fields of cane, remind us that Ismail Pacha, the Viceroy of Egypt, has become the first sugar-producer in the world. From the site of ancient Memphis to the southern boundary of Nubia, comprising about six degrees of latitude, the soil under cultivation rarely extends beyond the distance of a mile into the interior, while to eastward and westward it is one vast uninhabited waste. Thinly populated, and now without the means to subsist large agricultural communities, Upper Egypt can never become what it was when, as we are taught, the walls of Thebes inclosed 4,000,000 of people, and the Nile was bridged from shore to shore. Still, it is not all fallen splendor. The Viceroy’s steamers make the

trip from Cairo to the first cataract in ten days ; way-trading is carried on with the sailing Nuggers, and a steady stream of ivory and gum pours down the valley from the equatorial provinces. But all this portion of the Viceroy's domain will advance but little in agricultural prosperity until the problem of how to shed the waters of the Nile over the lateral country shall have been practically solved. Until very recently the most eminent river-engineers had urged that all the cataracts should be blasted, in order that uninterrupted navigation at all seasons might proceed between Khartoum, the capital of the Soudan, and the Mediterranean. But after careful surveys it has been established that any attempt to navigate or change the flow of water to Lower Egypt would impair the richness of the soil, if it would not entirely destroy the fruitfulness of the delta. Production depends not alone upon irrigation, but upon the nutritious matters held in solution by the irrigating water, upon the rich deposits which flow down from the Abyssinian hills at high Nile, changing the clear stream into a muddy complexion. Nature is thus very nice in her operations, and it was rare, indeed, until late years, that the river had varied from its habitual densities and levels. But obstructions have grown up spontaneously, about the ninth degree of north latitude, in the form of reeds ; and this vegetation, multiplying and extending, arrests all floating bodies of whatever nature, and the result is that the provinces bordering Nubia, not being as available for irrigation as the territory of the delta, have suffered famine and all its train of evils simply because the stream did not attain its accustomed level. If such fatal consequences come from mere spontaneous vegetation a thousand miles away in the interior of Africa, what would result if the cataracts were removed by experts as capable as Prof. Maillefert ? The nature of a Nile cataract must not be misunderstood. Generally speaking, it is only the river falling by a gentle grade through a series of rocks extending along the river for two miles or more. In conversation with the Viceroy, His Highness told me, " You know how the world has been crying out, ' Cut the cataracts.' " It must be with great caution that I undertake to alter the flow of the Nile. It is the blood of Egypt, and to trifle with the coursing of its waters is to experiment upon the life of my country. The engineers who have surveyed them and reported upon them say that the cataracts are necessary to Egypt ; that if they were not in the river all the water would rush down to the sea during high Nile, and leave the bed of the stream dry more than half the year. These



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WAR IMPLEMENTS of the NEGROES & ARABS of the SOUDAN.



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WAR IMPLEMENTS of the WHITE NILE NEGROES.

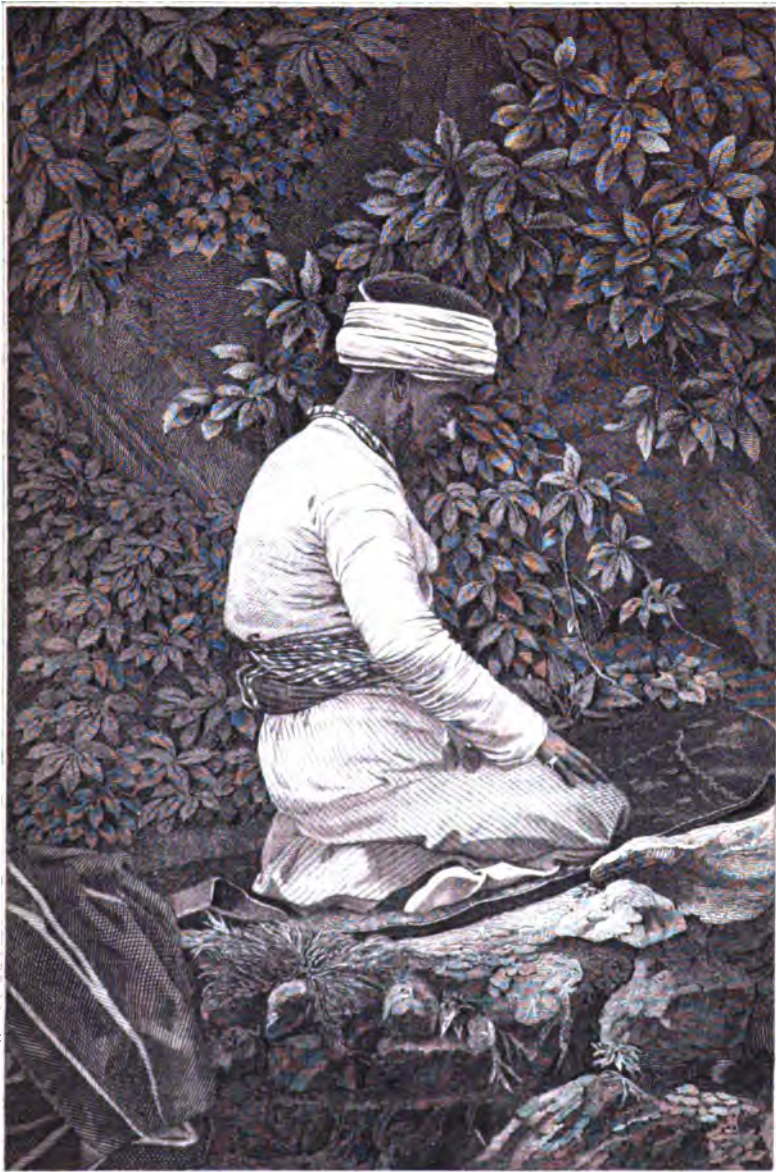
cataracts economize the water's distribution ; they are valves, and check its flow, and are a part of the machinery of the Nile."

This declaration of His Highness, wise and comprehensive as it is, furnishes a clear example of the difficulty of treating all physical problems in Africa. The conditions of any great work of engineering in Africa are so manifold, — those, for instance, of climate, arable land, distribution of population, communication, and habits and traditions of the people, — that money and skill may be spent in vain. The same truth applies to the whole of that vast continent. In order that you may comprehend this fact, look at the dimensions of Africa! Here we have a continent 5,000 miles long, and 4,600 miles broad, and geographers assert that it supports but a population of 65,000,000, — less than the number of the three Latin peoples of Europe. The different races are isolated in oases, and surrounded by deserts, while their rivers are full of cataracts, and their mountains are destitute of coal. The average-African — and by this being I mean the native negro, and not the Turk, Egyptian, Arab, or Abyssinian — is, without doubt, a stupid, ignorant creature; yet I have found him, even under a low degree of civilization, docile, intelligent, and as capable of governing as of being governed. When a bloody revolt occurred in the province of Takka, some years ago, among the negro troops, all of the Egyptian officers were seized and slaughtered during a general massacre. Turkish officials succeeded to the command, and tried to stay the fury of the mutiny, but without avail. It was only when a negro bey, a former private soldier in the army of Ibrahim Pacha, arrived on the spot that the insurrection was quelled. The Viceroy raised him to the rank of Adam Pacha, and the black savage boy who, fifty-five years before, was taken to Lower Egypt and sold, is to-day the commander-in-chief of the troops in the Soudan. This fact is mentioned simply to show that the negro at home is not such a pitiable creation as the majority of African travellers teach. I do not believe that a question like the civilization of Africa should be made a question of "odor," of "wool," or of "jaw," but rather one of humanity and fact. If the sympathies of the world and the movement of capital are to be directed toward the human enterprises that are already on foot for the liberation of that continent, we must consent to believe that the blacks are worthy of our efforts. Whatever contact they have had with the outer world has been the contact of slave-traders, despoilers, and assassins, and where they have become subjects of conquest it has always been to the banner

of Mahomet. Can it be supposed, then, that these 65,000,000 of negro savages, for forty centuries in solitary confinement, could evolve any pronounced civilization of their own? Could we ourselves, so placed and circumstanced, have realized any substantial progress? Abyssinia is a case in point. The natives of that country are not negroes; but their origin is lost in the far night of time. Yet, in color and habits, they would pass with us for blacks,—superior blacks, perhaps, because, like all mountaineers, they are active and belligerent. During many centuries this remarkable people, professing Christianity, have been almost completely surrounded by Saracen territory,—in fact, a Christian oasis in a Mahometan desert. What is the result? They have not changed. Where they were at the beginning of our era they are now, with the ruins of their once splendid cities and the remains of their glowing language, to prove how fatal stagnation is to any land or people. I urge, therefore, that the negroes can be civilized, and that the race can be brought to homogeneity and prosperity. But Egypt must first be dressed in Christian clothes, and the fatal influences of Mahometanism, as it exists all over Northern Africa, must be resisted and overcome. By missionaries you will say. Yes, by missionaries; but a missionary is not a man who goes out to the East to proselytize from one religion to another, and to teach cold theology; rather the Viceroy's definition,—a locomotive and a steamboat. His Highness is about to send these missionaries into the heart of the continent, and the route of the railroad to the Soudan I traced on my journey to Khartoum.

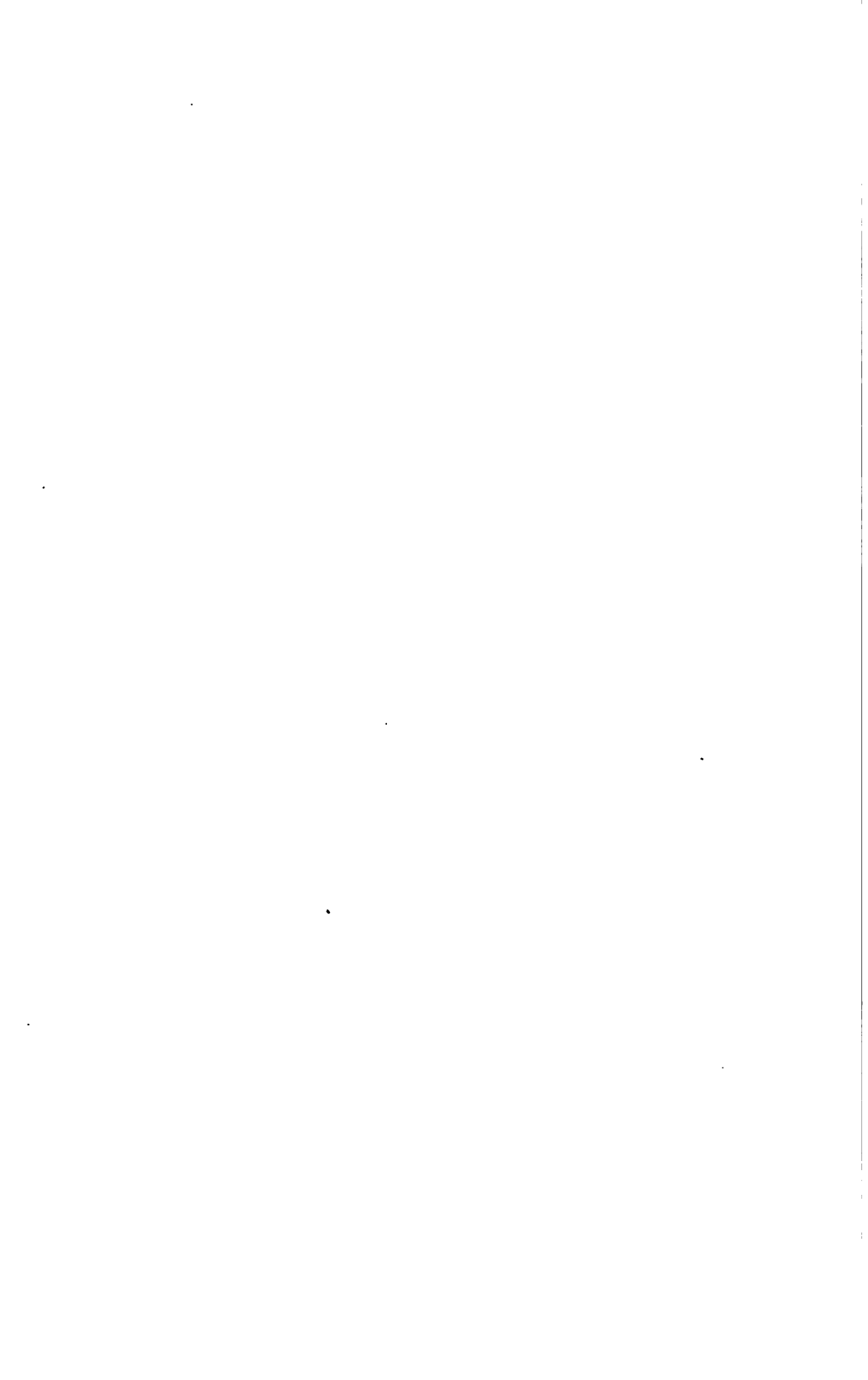
Perhaps I ought to confess to a learned society like this that the great enterprises by which Egypt hopes to link her commonwealth with the equatorial regions interested me more than the mere sentimental aspects of the sources of the Nile. These subjects, therefore, occupied my attention during the five months that I lived at the junction of the Blue and White Niles, where a new physical empire begins and stretches away to the equator. In daily conversation with the inhabitants and officials, and in journeys into the provinces, I gathered a great deal of valuable information concerning the topography of the area, which I believe to be the most fertile tract in the world.

Life in Khartoum, with all its complex scoundrelism and curious phases of crime, is simply the result of fifty years of the slave-trade. This commerce built up the city, and attracted thither the worst class of Levantine rogues, who ostensibly became ivory dealers, but,



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in fact, sent black ivory, or negroes, down the Nile and across to the Red Sea. A fast society grew up, and large mud mansions replaced the miserable pens which were employed when Mohammed Ali founded there the first military post. Few of the inhabitants escaped the debauching influences of the "sum of all human infamies". The Arab and Egyptian traders grew rich, and the officials, by active coöperation, participated in the spoils. Expeditions to gather slaves were, however, very expensive, and money was very scarce. All the capital in the Soudan was thus required, and the rates of interest varied from five to twelve per cent. a month. Yet (would you believe it, Mr. President?) fewer than twelve men carried on the slave-trade in Northern and Central Africa, and supplied Egypt, Arabia, and portions of Persia, Asia Minor, Turkey, and the lesser pachalics, with their eunuchs and menial labor. During the half century that Khartoum has been the slave-mart of this part of the world the Christian powers could not exterminate a band less numerous than an American jury! Do not believe that the traffic is confined to kidnapping and small squads of marauders. A slave-expedition starting under the title of an ivory-enterprise means war. As high as 5,000 soldiers are employed by a single trader. Agate had over this number on the White Nile; Cushick Ali, 4,000; Gatase, 4,000; Bizzelli, 800. Thus the slave-trade in the valley of the Upper Nile is sustained by an active force quite as large as the standing army of the United States. These troops, generally the hardy and cruel Dongolawee, are armed with knives and shot-guns; and whether it be to burn a village or massacre an innocent community, they are zealous in either task. One popular fallacy must be named. By examining the most exhaustive consular statistics on the ivory-trade, I find that no expedition could pay the first cost. The traders do not expect it; so that when you read of a great ivory-trader you may substitute, with little fear of doing an injustice, "an infamous slave-trader". The statistics of the slave-trader are very unreliable; and, though I spent a great deal of time in trying to get exact figures, I am very far from accuracy now. The slaves that come down the Blue and White Niles annually are estimated at 25,000, and those issuing from Darfour, Kordofan, and the Galla tribes, at 15,000 more. Concerning the export of Abyssinians, Gen. Kirkham, the Commander-in-Chief of the Emperor Johannes's army, told me, in London, that 90,000 was the annual drain, making 130,000 slaves. The average value of these slaves is \$60 a head; that is, \$7,800,000 in human flesh. You may

ask, What is the remedy? It is a difficult question to answer. So long as Mahometanism exists there will be a demand for slaves, and the supply will be inevitable; although it is not necessary to go to Africa to find atrocious but marketable merchandise always ready for the consumer. Domestic slavery throughout the Mahometan countries is very mild. In Egypt it has been abolished by the Viceroy by decree; but involuntary servitude remains as much an institution as it was fifty years ago. If stern political agents were kept on duty at Khartoum, Gallabat, Kassala, and Massowah, and if we had a representative at the court of Johannes, in Abyssinia, the evil might be greatly lessened. Yet the Moslem religion, teaching polygamy and the servitude of one race to another, is an obstacle of great magnitude. So long as the Turk has his harem, in fact, so long as the Koran remains his inspired law, he must have — he will have — slaves and eunuchs. Barricade all the outlets of inner Africa, seal up the mountain-passes of Abyssinia, and blockade the seaports from Suez to Good Hope, and yet the same silent caravans will be found stealing over the deserts, and the same suspicious slavers sneaking across the Red Sea and the Persian Gulf. The nature of the Turk and well-to-do Oriental is indolent. A slave serves his coffee; another must light his chibook; a third must perform his ablutions before prayer; while each wife and concubine is attended by her own domestic. The door of every private or official divan is darkened by a crowd of these negro menials, who are there to jump at the wink of host or guest. How vast, then, must be the demand for slaves when we consider that the human race is divided as follows, according to religion:

	Per cent.		Per cent.
Buddhists.....	31.2	Heathens.....	8.7
Christians.....	30.7	Jews.....	.3
Mahometans.....	15.7	Parsees.....	.01
Brahmins.....	13.4		

According to their ways of thinking, may not these 150,000,000 of Mahometans fairly claim the 65,000,000 of African negroes as their own reserves? Such would, indeed, be a melancholy prospect for Africa. But it can only be averted in two ways, — first, reform Mahometanism; secondly, civilize Africa. If we cannot do the first, we can do the second; for I have roughly computed that the Christian world has spent on missionary labor in Africa, since the era of telegraphs and railroads began, an amount sufficient to have built a railroad along the line of the equator, and to have bisected the continent from north to south. Let us be prac-





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DESERT ARABS.

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tical with the negro, for in his aboriginal state you cannot spiritualize him. He is too gross a being. The missionaries found at Gondokoro, four degrees to northward of the equator, that the young savage had religion in his soul only when he had food in his belly. But as this mode of Christianizing Africa would require too large a kitchen, they abandoned their post, and the blacks returned to their heathen gods. The Catholic Church of Austria has made the noblest and most persistent efforts to sow its faith among those far-distant negro tribes, and utterly, as with all other denominations, without success. The truth is, that a negro dwelling under the hot sun of Africa can understand no religion that does not countenance polygamy; hence he is an easy proselyte to the Moslem faith. Looking at the subject from a material standpoint, the continent can be developed in three ways, — by the Viceroy of Egypt, by foreign capital in the hands of an organization like the old East India Company, or by a stable government in Abyssinia pushing civilization to westward and southward. We will now inquire what there is in the Soudan to repay any considerable outlay of effort or capital.

The Egyptian Soudan, extending from the junction of the two Niles to the ninth degree of north latitude, contains a population of 7,000,000 of Arabs and negroes. The people live in villages constructed of baked mud along the shores of the White and Blue Niles; while the Bedouin Arabs roam over the deserts, and linger in the oases and mountains. Each village is governed by a sheik, as is each Arab tribe. Squalor and poverty characterize the habitations, and plunder and oppression the *régime* of the officials, high and low. Remote from the government at Cairo, they pursue a system of the most shameless corruption, worthy of the penal colony which they inhabit. During my stay in Khartoum it only took the Governor-General two months to rob the Viceroy and his subjects of \$250,000, — a prize that might not displease our own Christian statesmen. Almost every one of the nine provinces is far behind in taxes. Their resources, however, are immense. I surveyed, in company with the Governor-General, over 400,000 acres of the richest cotton lands lying southward of Khartoum, along a distance of 400 miles, bordering the White Nile. These lands are immense plains without tree or shrub, sloping away from the banks of the White Nile from five to fifty miles into the interior. They are watered during four months of the year — from June to October — by the tropical rains, but during the remaining months of the year

they are exposed to the scorching rays of the sun. It is estimated that in the nine provinces of the Soudan there are 140,000,000 acres of fine black, soft, loamy soil,—an acreage that would make two productive cotton empires, each larger than France. You need not plough this soil; you need not work it; you have only to scatter the seed and the periodical rains, or *sikeahs*, water the earth, and then, at maturity, you reap your harvest. It will be perceived that the irrigation is uncertain, and, if artificial, very meagre; because one *sikeah* turned by cattle-power can only water eight acres.

Since my return to the United States I have consulted Mr. Holly, an expert hydraulic engineer in this State, and he is elaborating a system by means of which these immense tracts may be brought under production. He suggests a wooden cylinder, with sufficient elevation above the outlying territory, that, as a water-head, it will command the whole area. He admits steam into the cylinder, and, by condensing it, creates a vacuum, when the water is admitted into the void, and discharged upon the soil at the rate of millions of gallons a day, and dispersed over the ground through conduits dug upon the surface. This plan would be cheap and effective; and it is proposed to operate it in such a manner that fifty square miles of territory can be irrigated from the same station. Schemes of canalization have also been suggested, like those of Lower Egypt. With the territory described, its 6,000,000 of beeves, 1,500,000 camels, and droves of sheep, a military force of 8,500 troops and 400 barks, what can its future not be made? It can grow all the products of India; and the negro, in working gold ornaments and straw goods, has proved himself the possessor of a high degree of skill. The natives who have not yet submitted—comprising tribes like the Dinkas, Neam-Neams—number as high as 10,000,000; though all estimates differ on this point. The measures that are necessary, then, for the development of Egypt's India are—

First—The conversion of the negro and Arab populations, from Dongola to the tenth degree of north latitude, into agriculturists.

Second—The building of the railroad to Lower Egypt, to Khar-toum, already surveyed, which will be worth \$100,000,000 annually to Egypt.

Third—Honest government.

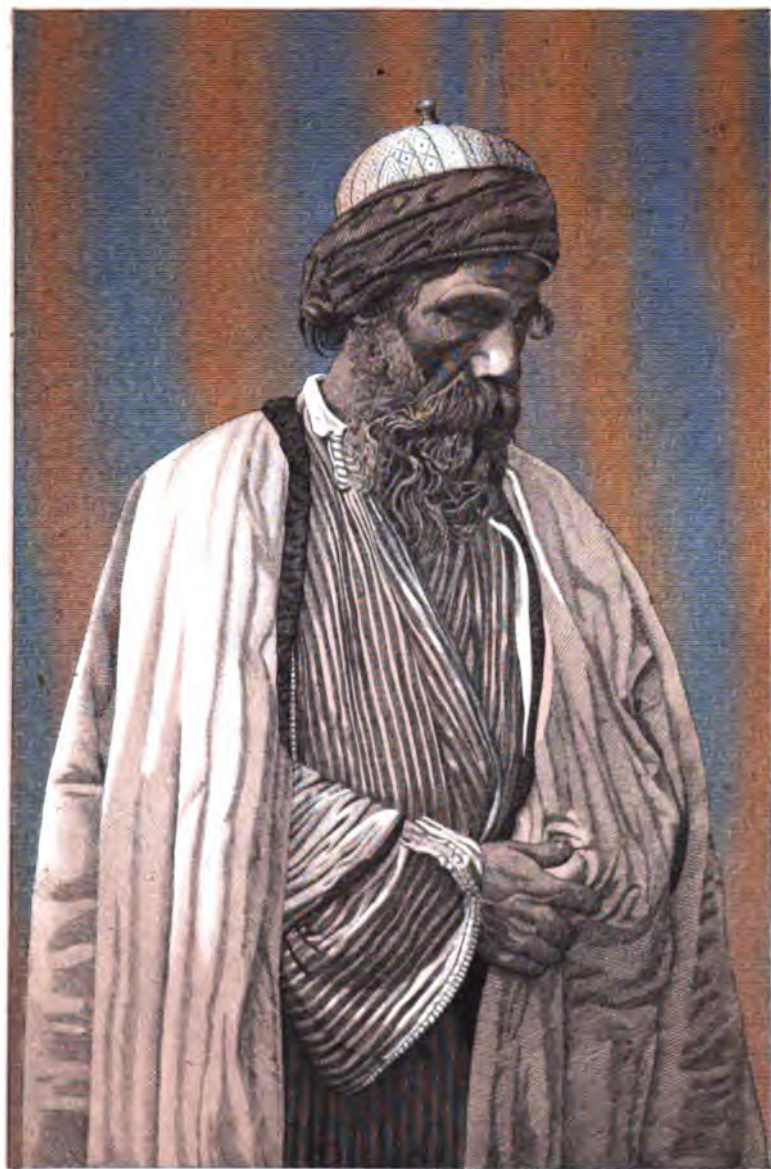
Fourth—Foreign capital and European machinery.

The experiment of growing cotton has already been tried with astonishing success. In the province of Berber, the Governor, Hussein Bey, whom Saïd Pacha saluted as the doorkeeper of hell



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A TYPICAL SLAVE MERCHANT.
of Khartoum.



After Howard Chandler Christy.

MOSLEM FERVOR.

when he guarded the entrance of the Nubian Desert, stored away 25,000 bales last year. The wharves of Suakin were lined with cotton grown in the province of Takka, and a general cotton-fever prevails all over the Soudan. The proud boast of the official is that in a few years the Soudan will compete with America to supply the markets of the world, and there is no reason why this prediction should not ultimately obtain. With soil under constant irrigation, one hand can work forty acres. He sows ten acres; while he is gathering in the crop ten adjoining acres are growing, and while the second ten are being gathered a third plot is maturing, and so on. For five dollars a year the negro cultivator can live and clothe himself; while to-day he is nude, dying from disease, starvation, and exposure, and eating fruits and herbs as monkeys do. Absolutely heathen, each tribe wars against its neighbor, demanding tribute of beeves, which, instead of consuming, the tribes worship. When the rail pushes through to Khartoum, and the varied products of this Empire can be borne speedily to market, in lieu of making a weary transit of two months by desert and river, money will pour in; and, instead of the \$2,000,000 now in circulation among 6,000,000 of people, there will be compensation for every producer. The Soudan can then be properly governed, for it will no longer be isolated from control in Central Africa.

The daily life in the Soudan is not without its charms. You are up half an hour before the sun. A cup of *café au lait* and a cigarette incline you to walk along the bank of the Blue Nile and await the golden day-burst in the east. But as the sun approaches the meridian you are glad to seek the shelter of your mud house, where you will find your divan overrun by Arabs, Egyptians, and Turks, who have come to smoke, drink coffee, and chat with you. Noon is the breakfast-hour. Pigeons, mutton, rice, bread, and melons make a delightful meal. Natives and foreigners are alike gifted with astonishing appetites; but nothing amazed me like the quantities of dense, black coffee consumed by every person throughout the day. Your afternoon *siesta* is an hour long, and then you wander out to visit your friends, to shoot, or to ride camels or donkeys. If you are required to go out during the intense heat of the day, you must carry an umbrella, because the sun's rays are poisonous, and once stricken down and you are on the high road to the malignant fever — which is death. The dinner-hour is six, and differs from breakfast in being more elaborate. After sunset, under Africa's clear, cloudless, star-lit sky, by the shores of the swift river, we used to

gather and talk over the future of the Soudan until midnight, or the sudden burst of a simoon would drive us to our beds. Imagine yourselves in the Soudan to-night. There would be no domestic controversy as to whether the window should be up or down, for you would sleep *à la belle étoile*, and no cross word to-morrow morning for the partner of your woes and joys who admonishes you "It is time to get up"; for the sun, beating down in your face, would roast you out of bed. The days are always intensely hot, reaching as high as 120° in the shade, but the nights are cool. I always slept under blankets. If three rules of health are observed in Africa you are comparatively safe,—First, do not expose yourself to the rays of the sun during the intense heat; second, do not drink spirits; third, be slow to anger. The splenetic man is sure to become a victim to the climate, and I saw many illustrations of this truth. The Soudan has been visited by many travellers; but few have survived its dangers, natural and climatic. Their deaths might oftener be ascribed to their own folly than to any other cause. Three Englishmen went to Khartoum, filled with a grand project, a few months before my arrival on the Blue Nile. A compact which they had made was found among the effects of one of them after his death, and the following is a literal copy:—

"We, the undersigned, having formed ourselves into a society, for the purpose of exploring and trading in Equatorial Africa, do for our mutual satisfaction solemnly bind ourselves by oath faithfully to observe and keep the following conditions, to be strictly observed from the date of signing these articles of agreement until such time as with the common consent of all of us the aforesaid society shall be dissolved:—

"*First*—To entirely abstain from all intoxicating beverages.

"*Second*—To have no illicit connection with any woman.

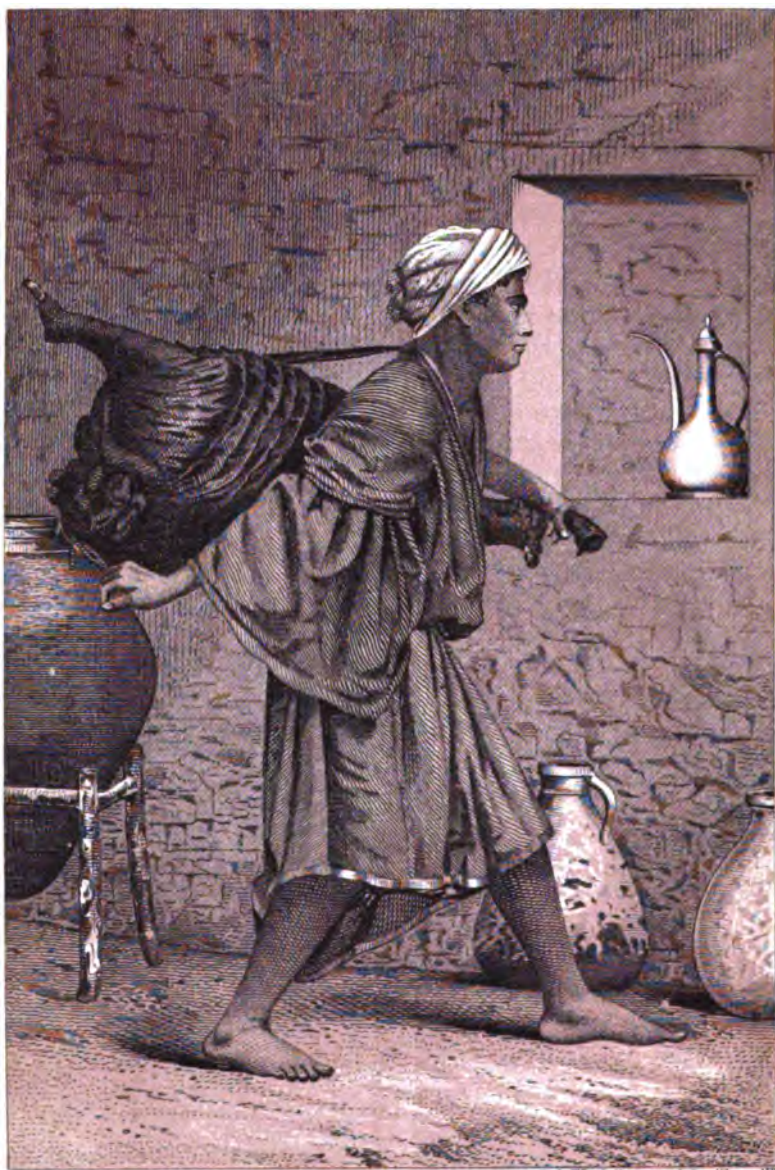
"*Third*—To be true and just in all our dealings with all mankind, but to have no dealings with Papists.

"*Fourth*—To use our utmost endeavors to spread the true and pure worship of the Almighty among the heathen tribes of Africa and elsewhere, and to utterly put down, suppress, and exterminate, with the edge of the sword, all false creeds and such as we know to be antagonistic to the free and unfettered worship of God as revealed to us in the Bible, and always render all assistance in our power to any godly brethren who may be in need of it.

"*Fifth*—For the maintenance of order and discipline, without which no great end can be achieved, we agree to elect Edward Pratt captain of the expedition.

"*Sixth*—William James Bond, Edward Patterson, and Frank Sheppard, for our part, faithfully promise to ever obey, without question, all orders promulgated by Edward Pratt, believing that all orders given by him are for the good of ourselves, and for the good of the achievement of the end we have in view.

"*Seventh*—I, Edward Pratt, do, for my own part, in the presence of God and my fellow-comrades, promise henceforth to make all my talents and powers subservient to the society's interest, and to undertake nothing which will not benefit the society; and, as far as I can, that I will issue no orders and command nothing without the sanction and approbation of a quorum of the society; that I will, if



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THE WATER CARRIER.



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DONKEY BOY & HIS CHARGE.

need be, lay down my life for the society, and never flinch from doing my duty to the society, although the performance of that duty may cause the total destruction of my earthly hopes.

"*Eighth* — We all agree to have a common purse in all troubles and reverses, as well as in prosperity, share and share alike, without distinction of rank.

"*Ninth* — As we all believe in the existence of a Deity, and of a state of future happiness or misery, it will be our constant aim and endeavor to walk in a manner pleasing to the Almighty, to do which we agree to take the Scriptures for our guide, and direct our actions according to the dictates of it and those of our consciences.

"*Tenth* — And as the achievement of our end depends upon our being firmly united, we swear to be true to each other as steel, and to have no private schemes whatever; to warn each other of danger; we swear to allow no private quarrels or jealousies to arise between us, but to always prefer each other's welfare to our own; and we each swear, by Divine assistance, to resist temptation from the date hereof to the dissolution of the society, never to forsake our comrades and the interests of the society by the offer of temporal wealth, be it ever so great, but to devote such wealth, if possible, to the common cause of the society.

"And now, in the presence of God and in the presence of each of us, we swear faithfully to abide by the above written articles of agreement; and each of us, for himself, doth agree if at any time he violate any of the foregoing articles of agreement, to suffer death or such other punishment as the said society may award; and we all swear to follow up such offender to the end of the world and mete him out justice, even to the day of our death. So help us God.

(Signatures.)

"MALTA, 5th April, 1869."

Comment upon a compact of this nature is unnecessary. These three Englishmen penetrated to the Soudan without money, without any knowledge of the extreme perils which they were to undergo; and in one of the humblest quarters of the Ethiopian capital, discouraged, pursued by malignant fever, the two oldest died, and the third, in the direst misery, succeeded in reaching Cairo.

Dr. Brownell, of New York, died in the obstructions in the White Nile while attached to the expedition of Petherick as botanist. At his decease he had gone further into Central Africa than any other American. Mr. Bayard Taylor had gone before him, but finished his journey with the *shillooks*, some twenty years ago. Upon my departure from Khartoum I left with the intention of going to reconnoitre the *débouchement* of the Bahr-el-Ghazal, preparatory to a lengthy voyage, the immediate object of which was to join Sir Samuel Baker, and, having reported the progress of his expedition, to move westward along the equator, across Africa to the Atlantic Ocean. In a letter dated Khartoum, June 5th, 1872, and addressed to Dr. Gardner, one of the members of your Society, I thus explained my object:

"I found difficulties at almost every point on my arrival here. It was too late to go to Gondokoro; there was a passive hostility on the

part of the Government. I had left Cairo hastily and without full preparations, little dreaming that the route by the Nile was so badly clogged up and blockaded by the 'Sudd', and my ultimatum was to reach Baker. A closer view of the ground and a better knowledge of the tribes somewhat changed my plans. The brave and expert traveler and *Herald* correspondent, Stanley, had left Zanzibar with a splendid expedition, fitted out at great cost. His mission was to find Livingstone, and I knew if any one could achieve that result it would be Stanley. Well, I concluded it would be best to push for Gondokoro, then turn westward, and, if possible, try to reach the seacoast, and traverse the African continent. Such is my present idea. Circumstances may change it. You know I believe in doing the best thing, and not in pursuing a course certain to entail failure and disaster."

It was on March 18th that we were forced to anchor off Arboh Island, over 300 miles to the southward of Khartoum. The shallow water would not allow us to proceed, and thence in the midst of the luxuriant tropical scenery, nearly 2,000 miles from the Mediterranean, I was obliged to turn back to await high Nile and the north wind. The spot was indeed picturesque and beautiful. Yellow-straw houses, built under the shade of immense trees, looked very neat and enticing, and the scenes about them were animated. Thousands of gray monkeys are leaping from branch to branch! Yonder lofty mimosa is the retreat of a hundred black eagles; the negro *shillooks* are riding cows; Arab craftsmen are spiking the streaks to a bark in embryo; the air is black with pigeons, and the river swarming with ducks. Baker's boats are lying by the shore waiting for the coming season; and the sounds proceeding from beeves, camels, and donkeys, tell one that he is on the brink of savagery. I was enchanted with the White Nile. The river of Lower Egypt has a dull, gloomy aspect compared with this broad stream, winding around green islands under high cultivation, swelling into lakes of several miles in width. A hundred times a day the Governor-General would break out with an exulting shout, "*Arq qui-eece qu-teen!*" — "What magnificent soil!" The country radiating in every direction from Arboh Island is the recruiting-ground for menageries and zoölogical gardens. It is the proudest empire of the beasts of all families, not excluding the human family. A bird's-eye view of Africa would disclose the paltry minority of man. For the first time, perhaps, we would comprehend our human solitude. Here a few men, there a few, huddled under the shadow of a mountain, clustered on the Nile, or grouped in some small oasis. But our physical superiors — the elephant, the lion, the panther, the hyena, the leopard, and the gross monkey, and their associates — are in

work



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DANCING GIRLS.

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A CHIEF EUNUCH.

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masses, in herds, in vast communities, if you please. I obtained, for the benefit of those who may wish a collection of live animals, a statement of the expense for 300 of all species, and this number could be delivered at Alexandria for \$30,000. An estimate which I made of an expedition across Africa, starting from the White Nile, shows that it would cost, for 100 men, about \$28,000 for two years.

On June 17th I began my homeward journey, sailing down the Nile a distance of 250 miles to Berber, and thence I crossed a second desert to the Red Sea. All desert-travel in Africa is severe. Your face peels, seams open in your lips; your shoes warp painfully about your feet; your bones ache, and you utter but one prayer, "O for the land of green and water!" After fifteen days from Berber I arrived at Suakin, and proceeded to Massowah, the port of Abyssinia. The Viceroy's expedition was moving toward the province of Bogos; and I then maintained, as I do now, that it would be a crime to permit this Switzerland of Africa to pass under Egyptian rule. The Viceroy wishes those hills, because they contain coal. In his domain there is none. Gold and other ores abound, and there is a population, including the Gallas, variously estimated at from eight to twelve millions. Gen. Kirkham, the special ambassador of Johannes to the Western powers, recently returned with assurances from Berlin that Germany would guarantee the inviolability of Abyssinian soil. I will not discuss the merits of the question here, but will simply observe that the country is peopled by noble races, ambitious to better themselves and the continent on which they dwell. I may add that there is a prospect for the immediate civilization not only of Abyssinia, but of all the countries in the Soudan. Sir Samuel Baker is revolutionizing the great basin of the Nile, and he will scarcely return without settling the main question of doubt concerning the sources of that mighty river. I am glad to say that his reputation in the Soudan is one of which any traveller might be proud. Of Dr. Schweinfurth, it is gratifying to say that his discoveries were confirmed by the men who had accompanied him. He left Khartoum some months before my arrival, but I saw many persons who had inspected the dwarf he had brought down from the equatorial regions. This pigmy was about three feet high, and was, as near as I could learn, half monkey, half man. The importance of his discovery lies in the fact that the race of Tick-y-Ticks is the first living proof that we are allied to the beast world,—giving probably more satisfac-

tion to Mr. Darwin than to those who still contemplate our parents in the Garden of Eden.

Miani, the veteran white-bearded Italian traveller, with a few soldiers furnished by the government, is exploring the right bank of the Nile, near latitude ten degrees north. He moves among the natives with a kindly manner, never exciting their opposition or hatred. Marno, the young Austrian, is also on the White Nile, making collections of birds and fish. But the most interesting traveller I met during my stay in the Soudan was the Arab Snygettea, who is probably the only man who has ever crossed Africa to the northward of the equator. My conversations with him were long and frequent; but, as he had no idea of a map, they were without value. He was a wandering Arab priest. As a Mahometan he had no trouble in walking from Senegal through Timbuctoo, Wadia, Darfour, to the White Nile and Khartoum, a belt of territory where the people believe "there is but one God, and Mahomet is his prophet". He claims to have seen ruins, ancient temples, obelisks, and pyramids along his march, indicating that the Ethiopian empire once extended into the heart of the continent. In Wadia he claims to have seen the grandest relics. I tried to buy his manuscripts in Arabic; but he resolutely refused, because he feared that the government might oppress him in case he sold them. His reputation is, however, that of a *blagueur*.

Of the sources of the Nile it is hardly my province to speak. Yet I have noticed one striking fact during my travels in Africa which I consider of great weight in deciding this question. The continent is covered with vast depressions, which were undoubtedly in prehistoric times the sites of great lakes. Deep gorges intersect the deserts. Their configuration points to the conclusion that they were once river-beds. But the bodies of water and streams which once supplied the valleys are dried up. Many causes may have effected this result. When Africa to the confluence of the White and Blue Niles was a great empire—and proofs of its puissance are being daily discovered about Khartoum and the Great Bend of the Nile in the form of buried ruins—it is possible that high cultivation and great cities were productive of copious rains. We all know that trees and vegetation will produce rains where they would not otherwise fall. These dried-up water-courses, then, and empty basins are doubtless bequeathed us as a part of the general ruin which Africa has suffered. Keeping this theory in mind, how can Dr. Livingstone feel absolutely sure that the sources of the Nile have



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THE WATER CARRIER.



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THE BARBER.

remained unchanged since the days of Ptolemy? It is believed that from time to time Africa has been visited with great upheavals. All the mountains I have seen are purely volcanic. Might not volcanic action have changed the geography of the water-sheds? May not Dr. Livingstone's new lakes have been empty basins in the time of Ptolemy? To show you how great physical changes may take place in Africa note one fact, that twenty years ago you could go to Gondokoro in twenty days, and now it takes nearly a year to penetrate the White Nile obstructions, which the best informed of the Soudan fear may ultimately cause the deflection of the White Nile by lateral outlets, in which case Lower Egypt would wither into an arid waste.

And now, Mr. President, to whom is committed the destinies of Africa? To a little, thick-set man, with a large head, full face, pleasant countenance, and clear eye. His face denotes kindness, reflection, caution, and firmness. To give you a New-York idea of his magnificence, I have only to say that he is regarded as the richest man in the world; but, to estimate him truly, I believe him to be the most remarkable and ambitious of modern rulers. I mean the Viceroy. He is absolute in Egypt. That fertile land is his capital stock. It is just the same as if Egypt were deposited in the Bank of England, and His Highness should draw checks against its market-value. The Soudan is his great pride and charge. He is determined to push railways and telegraphs to its remotest peoples, and to acquire as much territory as he can occupy and control. He has recently changed the Governor of Khartoum, appointing Ismail Pacha, a travelling friend of mine; and I feel sure that this enlightened official will carry out many grand projects which we often discussed under the roasting sun of the Nubian Desert. He used to say that he would live to see the day when a steamer from the Mediterranean could proceed up the Nile, and finally cast anchor in the equatorial lakes. Is it not possible, then, that Egypt may resume some day the proud position which she once held in the world; that a population of 30,000,000 of agriculturists may send their products to market; and that ultimately all Ethiopia, like Lower Egypt, may have thriving cities? If the Viceroy continue in the path of progress that he has followed since the beginning of his reign, you may be sure that the empire will soon extend beyond the equator.

What are the Viceroy's foreign relations? Turkey has never slackened her appetite since the founders of her present empire in

Europe crossed the Bosphorus, and the last evidence of her greed has been in the \$15,000,000 which the Sultan complacently received from the Khédive. If the Egyptian sovereign pays to the "King of Kings" this princely sum as the price of a single favor, how long will he continue to purchase with gold what possibly he might achieve by violence? As he goes forward constantly in his movement towards independence he must purchase fresh privileges from the Porte, and these can only be obtained by generous supplies of coin.

It is estimated that Egypt can easily summon 200,000 Arabs, Copts, Egyptian peasants, Nubians, and White Nile negroes to her service at the command "Fall in!" It is thus plain that Ismail Pacha will be called upon (if he live to work out his independence) to reflight the bitter war which Ibrahim Pacha fought with so much valor in 1848. This stern soldier, who survived but a few weeks the dignities of the viceroyalty, came nearer to a complete reduction of Constantinople than any other captain of his time. To-day we have a rich Khédive, with an exhaustless continent, on the one hand; and a poor Sultan, with an exhausted empire, on the other.

Thus, whatever must concern the future relations between the weakest power in Europe and the strongest one in Africa will be decided by a preponderance of gold and army-strength. Money Turkey has not; finer soldiers than those who fill the ranks of the imperial corps at Constantinople are seldom seen; yet the Turks, with all their blind courage and splendid *élan*, are to-day pitifully weak. They have demanded arms. A ministry, desiring a downy nest rather than full arsenals, has so distributed the patronage that the country will not be in fighting condition under two years. One of the ablest military critics has placed the army-maximum at 300,000; yet, with frontiers like those of Greece, Montenegro, Russia, and even Servia and Roumania, it is very problematical how much of this body could be sent upon such a hazardous enterprise as the reduction of Egypt, with her torpedoed Suez Canal and coast, her fortified harbors, together with the physical support and moral sympathy she would undoubtedly draw from the rest of the world. And if we leave the military and examine the political situation, we find no encouraging prospect for Turkey. In three months she has had three grand viziers, and it has passed into one of the phrases of the day that all her mature statesmanship was buried in the grave of Ali Pacha. Each ministry in turn adopts a new line of policy towards the Khédive; and it is noticeable that while many threats



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A CONSULAR JANNISARY.



Lith. Wood, Parsons & Co. Albany, N.Y.

A BEDOUIN.





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A DANCING GIRL .



Lith. Wood, Parsons & Co. Albany, N.Y.

DR. GEORGE DEMETRI.
Surgeon of the Army of the Soudan



THE TYPICAL ABYSSINIAN SLAVE GIRL.

are issued from the Sublime Porte, they only ripen into a quiet acquiescence to every one of His Highness's acts. His swift yacht, which has made the voyage from Alexandria to Constantinople in fifty-two hours, is rarely at anchor in either harbor; and the capitals of both powers are entertained with stories of the varying quantities of bullion that are said to make the frequent transit of the sea. The Turkish navy differs somewhat from the Turkish army, in that the ships and weapons are able, but that the men who man them are not. We know, too, that Turkey has been begging for a loan of \$50,000,000, and at least the largest fraction of this amount is to be applied to paying the overdue interest upon previous obligations. In view of these facts, it looks as if Turkey stood towards Egypt as a wretched and pauper father does towards a rich and prosperous son.

III.

THE WONDERS OF THE YELLOWSTONE.

BY MAJOR-GEN. JOHN GIBBON, U. S. A.

READ APRIL 15TH, 1878.

MR. PRESIDENT, LADIES, AND GENTLEMEN,—When Lewis and Clarke, more than sixty years ago, made their celebrated expedition to the Rocky Mountains,—the account of which rivals in interest the adventures of Robinson Crusoe,—they were arrested in their water-voyage at the Great Falls of the Missouri, around which they were obliged to make a portage of about twenty miles. Once above the Falls, they pursued their way in boats, through as good a draught of water as there is in the river at Pittsburgh, Pennsylvania, to what is called the Three Forks of the Missouri. The river is here divided into three branches, which the explorers named the Jefferson, the Madison, and the Gallatin. The first, or western branch, they followed to its source, and thence westward across the Rocky Mountains to the headwaters of the Columbia. On their return the next year (1806), the party was divided; and one portion of it, under Captain Clarke, came back by way of the Three Forks, and from there made its way up the eastern fork,—the Gallatin,—through one of the most beautiful and productive valleys of the West, now rapidly filling up with thrifty farms. Waving fields of luxuriant grain now replace the tall bunch-grass of Lewis and Clarke's day.

At the head of this valley stands the little town of Bozeman, with the garrison of Fort Ellis close by. From Fort Ellis, eastward, several passes through the mountains lead to the waters of the Yellowstone; and by one of these Captain Clarke, under the guidance of a friendly Indian squaw, crossed to the Yellowstone, and, constructing boats on its banks, passed down to the Missouri, where he joined Captain Lewis with the rest of the party, which had gone down the Missouri River.

From Fort Ellis, as a starting-point, I design to lead you to-night across to the Yellowstone valley, and up that route to explore some of the wonders of the Yellowstone.

Twenty or thirty miles from Fort Ellis the traveller reaches by a good wagon-road the broad open valley of the Yellowstone. On the low hills and level benches, clothed in luxuriant bunch-grass, immense herds of tame cattle are seen feeding, and serve to remind us that we have not yet entirely bidden adieu to civilization.

These level "benches," as they are called, form a marked feature in all the valleys of this region. They are more regular and well defined in the valley of the Madison than any I have yet seen. In that valley they rise one above the other in regular succession, and serve to remind us of the time in the far distant past when these valleys were vast sheets of water, whose shores were formed in succession by these benches. The storms of rain and snow, season after season, brought down the disintegrated rocks and vegetable matter from the mountains alongside, and partially filled up these ancient inland lakes, whilst the waters were working their way through the cañons of the mountain-ranges lower down the streams. When the work in the cañons was sufficiently far advanced to drain off the waters to a lower level, the lakes receded down to a certain point, more material came down from the mountains, other shores were formed; another break in the cañon occurs, another recession of the waters takes place, and so on until the work in the cañon is finished, and the bed of the river assumes an almost uniform slope. These level benches, or terraces, are always found above the narrow cañons where the stream has worked its way through a mountain-range.

Travelling up the bank of the Yellowstone we reach Boettler's Ranch, where beautiful and luxuriant fields of grain, fed by streams from the side-hills, are waving in the bright August sunlight. Turning our backs on these, we bid farewell to the last relic of civilization and the only post-office on the road to the upper waters of the Yellowstone.

Away off to the south, on the other side of the river, Emigrant Peak thrusts its top up into the clear atmosphere, its sides covered here and there with perpetual snow, which glistens in the warm sun, and makes one feel cooler by looking at it. These patches are formed of perpetual snow, because before this warm August sun will have reduced them to water, another layer will be deposited on their smooth, shining surfaces, and long before any falls in the deep

gorge at the base of the peak upon the miners who pursue there the search for gold.

We pursue our way up the river, — here swiftly flowing past; there quietly winding its way along, — its smooth, clear surface broken only occasionally by the leap of a great golden-yellow trout, springing at some imprudent fly whose fluttering wings carry him too close to the glassy surface, beneath which thousands of bright and eager eyes are watching for just such fellows as he.

A few miles farther, we enter the mouth of the second cañon, and here bid good-by to the wagon-track which so far has kept us company. Henceforth a single trail — and sometimes not even that — is to be our guide.

As we enter the cañon a great hill of solid rock stands on the right, and as we pass at the foot of its perpendicular side the upstream surface is seen to be worn, as smooth and polished almost as glass, to its very top, as if in former days this immense space had been filled for ages with a mass of ice, rocks, gravel, and debris of all kinds slowly grinding its way down to a lower level, and had expended on this solid obstacle standing directly in its path all its fury, to thrust it out of the way. It stands there still, the faithful sentinel of the force of other days, like some venerable soldier of the Old Guard, bearing upon its face the partially healed wounds of the conflicts it has gone through; whilst the remnant of its former gigantic antagonist flows gently by at its foot.

The gorge, as we ascend, grows narrower and more broken; we commence to pick our way carefully and slowly through the broken stone which covers the ground, and finally reach the foot of a mass of ragged rock which rises far above our heads, apparently barring our further progress.

Wild animals have, however, been here before us, and left the faint record of their footsteps; and more recently some enterprising individuals have here and there picked out some of the stone, and made a few attempts to grade a wagon-road over the hill. Following these marks of bygone and present days, we pick our way to the top of the hill, and an exclamation of delight bursts from the whole party at the magnificent scene which breaks upon our view. On the right rises the precipitous wall of the cañon; on the left, great mountain-peaks tower to the skies, their rough, rugged sides seamed here and there with long smooth slopes of disintegrated rock, down which an enterprising schoolboy might "coast" in winter-time for a thousand feet or more; though how he would get

to the top to commence his operations is his business, not ours. Far up in the cañon the river, of a beautiful sea-green color, flows quietly amongst the trees through a green meadow, whilst far down beneath us — in one place almost at our very feet — it tumbles with a roar through its rocky confined bed, one mass of milk-white foam, here and there heaped up in great banks, where the impetuous torrent encounters a rock as big as a meeting-house, which some day has toppled down from the crags above.

From this enchanting spot we wind our way down into a pretty little cove in the midst of the cañon, where pure streams of clear, cold water, flowing across from springs at the foot of the wall, fall into the river. Beyond this, we encounter another rough, rocky point, extending down to the very shore of the river. As we pick our way along the narrow path, on each side of which the rocks encroach so closely as to scarcely allow the passage of a horse, much less one with a rider, one is tempted to echo the wish of the discontented individual who said, if *he* had had the making of man, originally, he would have reversed the position of the lower limb, so that the tibia would have had some adequate protection in rough countries.

Our course lies still up the Yellowstone, through ranges of high, rolling, desolate, and uninteresting hills, past what is called Cinnabar Mountain, from a mistaken idea that cinnabar exists there. Its red color, however, is due to iron. On the southern side of this mountain is a formation called the "Devil's Slide". The whole mountain itself is formed of ledges of rock, which have been tilted up into an almost vertical position. The "Devil's Slide" consists of two of these upturned ledges, between which the softer material has been washed out by the abundant waters of bygone days. The walls of the slide — fifty feet wide and three hundred feet high — stand about one hundred feet apart, like the ways of some immense "Great Eastern"; but the Devil himself could not slide down their rough, rugged surfaces. Between the two walls, high up on the mountain, great pine-trees are growing, and larger ones lie rotting on the ground, mutely testifying to the long ages which have elapsed since torrents of water swept through this gorge, where now not a drop is to be found.

Just before reaching Gardner's River, which flows into the Yellowstone from the west, we leave the valley of the latter and turn up that of the former. Why called *Gardner's* River it is hard to discover, for certainly no gardener who knew anything about his

business would ever settle on the barren, desolate hills which border it on each side.

But desolate as is the country in appearance, it contains a wonder, the like of which I doubt can be seen anywhere else upon the earth's surface. Other countries have their wonders, — their earthquakes; their volcanoes, extinct and active; their hot springs, and their geysers. America alone, so far as I have heard, has her "frozen cascades", — falling waters turned literally to solid stone.

Six or eight miles from its mouth of Gardner's River is divided into three branches, — the eastern, middle, and western; and to the north of the western fork occurs the wonder which in coming time will attract the visitors of the world. A valley some four miles long, and varying from two hundred yards to a mile and a half in breadth, is filled with a formation unique in itself, and, I suspect, without a parallel in the world, unless possibly in New Zealand. Our path leads us across this valley, at the point where it joins that of Gardner's River; and the feet of our horses, as we pass along, give out a hollow sound, as if we were travelling over a cave. Suddenly we come upon the edge of a great sink in the ground, from the bottom of which boils out a large stream of bright, clear, warm water. This is the subterranean outlet of the hot springs of the upper valley.

Turning to the right, we now mount a slope, and find ourselves on a level plateau, covered with large pine-trees, grass, and flowers. Another, and still another, is reached; and it is noted that the ground under our feet is composed of a fine-grained kind of dirty lime. At length, passing through a thick grove of pines, we come upon a plateau of larger extent, almost bare, except that here and there is a clump of pines, and every now and then a vast chasm yawns in its surface.

Suddenly we round the point of a hill, which here contracts the valley, and a magnificent spectacle bursts upon us. How can words paint the picture? How is it possible to convey to you any adequate idea of the scene? Feeble words fail in the attempt; and to appreciate it you must *see* it.

Before you stands a vast pillar, which, from its form, has been named the Cap of Liberty. Inside, it is hollow; and in times past a column of water flowing up through it and out at the top deposited its sediment, building up this vast column, until, the pressure of the water becoming greater and greater, another outlet at a lower level was forced, and this monument left to tell us its own story. Storms

have beaten upon it, the frosts of winter have penetrated into its surface, and its sides have been gradually worn and broken away until they present the reduced and rugged appearance of to-day.

Behind the Cap of Liberty, and to the right of it, appears a formation which, at first sight, reminds you of the unfinished foundation of some vast marble edifice. The rigidly horizontal lines rise one above the other, and extend to the right and left, recalling the masonry of human hands. All is of pure white, shaded here and there with a darker tint; and every apparent block seems as if chiselled with the most exquisite sculpturing. As you draw nearer, however, you find that this appearance of sculptured blocks of marble is produced by the horizontal edges of a series of basins, rising one above the other, which were formed in years gone by, and to-day are being formed in just the same manner, from the water depositing the material which it holds in solution,—a kind of pure white substance, not unlike slacked lime,—and which, when moist, you can press in your hand like plaster of Paris. When dry, and after it has been exposed to the air for some time, you would think, on walking over it, or rather through it, that you were traversing the site of some extinct gigantic flour-mill.

Rising step by step over this beautiful formation, you reach the higher level of a great basin, filled with bright-blue, clear water, from the surface of which floats slowly away a thin cloud of steam. In the centre of this basin, boiling up a foot in height, is a column of water, the bubbling and steam from which impress you with the conviction that where that water comes from must be an uncomfortably warm place. If you are of a curious turn of mind, take a timely warning, and do *not* test the temperature of the water by sticking your hand in it. If you *must* try such experiments, let me recommend, as preferable and more convenient, a small tea-kettle of boiling water.

Overflowing its basin, this water trickles down into the lower basins, one after the other, spreading to the right and left as it flows, and, wherever it leaves the rim of one basin, forming another one just below. The whole plateau on which this pool stands is formed of these basins,—some of pure white, showing their recent formation; others, and by far the greater number, extinct and crumbling to pieces. As you walk, crushing thousands of these beautiful forms under your feet, a natural feeling of regret comes over you, which is, however, relieved in a measure when you recall the fact that there are plenty more where these came from, and that, although

is this formation which, scattered about amongst the basins, gives the whole the appearance of a cascade.

You all know how shallow water running over a surface ripples into waves. Now, wherever this water runs it seems to deposit, in regular layers, the material which it holds in solution. The consequence is, that it forms on the surface beneath an exact representation of the rippling waves; just as you would take a plaster cast of any solid substance. It is, in fact, to the eye, solidified running water; actually a cascade turned to stone.

As a proof that this picture is not exaggerated, let me request you to test it by looking on a photograph of the original, of which many have already been taken. The lighter parts are either very recent formations, with no water on them, or they are now actually forming, with water running over them; and yet your eye cannot detect which is water and which stone!

But, beautiful as these photographs are, they cannot give you an adequate idea of the splendid sight, for they leave entirely out the magnificent colors which are deposited by the water, as it runs, with all the varieties and brilliancy of the rainbow.

Seeking a place where the inclination is not so steep, we climb up to the top of this grand cascade, crushing thousands of beautiful forms at every step, and passing a spot where some enterprising individual has placed a trough for the water, and built a shady arbor that he might enjoy a shower-bath. He was careful, however, to select a place so low down that the water, exposed to the cooling effects of the air, would not render parboiling probable. Here you can take a bath of any temperature to suit your fancy, for if it is too hot you can, like the thermometer, go lower; and if too cold, higher.

Arrived on top, a sight meets the eye far more wonderful than anything we have yet seen. This plateau is one vast system of pools of boiling water, spouting up here, bubbling there, and smoking everywhere. This one next to us is probably thirty feet across; the water is a bright, clear blue. It has formed a break through the edge of its basin, and is rushing in a torrent into the next one, through an opening richly tinged with red, brown, and other colors. Its waters, mingling with those of the other, form a dark saffron; whilst beyond is a third pool, of a bright yellow color, from the sulphur with which the water is impregnated. Now, imagine every possible shade of color between those I have mentioned, all rippling in the moving water, and reflected from the bright, smooth edges of

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the basins, and you may be able to form some faint idea of the exquisite beauty of the picture.

Approaching the edge of one of these pools, and looking over, you seem to be standing in mid-air, for the water is of crystal clearness, and the edge on which you stand projects to a considerable distance over the water. The sides of the pools are formed of gracefully scalloped curves, the extreme edges of which, touching the water like newly formed ice, are as hard as flint and as smooth and transparent as the most delicate porcelain. The play of colors through these exquisitely-formed embroidered edges is something wonderful to see. Where the water runs off from these basins, through shallow channels to reach the edge of the cascade, it has deposited a sort of silky vegetable matter, and this has become colored with all the rainbow-hues, so that looking down upon it you see feathery plumes, of every tint, waving back and forth in the rippling waters.

I am afraid if some of our lady friends could catch sight of these waving plumes they would get out of conceit with those which they now wear, for the former are far more handsome. Nature is always more beautiful and perfect in her works than man or woman. These variously tinted plumes are beautiful to look at as they wave gently back and forth in the rippling water. The moment they are taken from the water, all their beauty disappears as suddenly as the rainbow vanishes when the rain ceases to fall.

In the cooler and shallower pools another beautiful feature is seen. The water apparently has reached its freezing-point, and is covered with a thin film of ice-like formation. You can write your name in the thin, brittle structure with your finger; but you will find the water beneath still warm. The formation looks like the most delicate film of porcelain, and is probably the same material of which the basins are formed. Along all the scalloped edges of the basins is a row of smooth, porcelain-like tips, formed like delicate finger-nails; their sharp, knife-like edges resting just at the surface of the water. At the edge they are as transparent as glass, and thickening towards the base, where they are joined so firmly to the scalloped rim of the basin as to require a sharp blow with a hammer to detach them.

I might detain you here for hours, telling of the ever-increasing wonders and beauties to be seen at every step about this enchanting spot. Of the wonderful crystalline caves, once filled with water, but now empty; of places where, away down deep in the bowels of

is this formation which, scattered about amongst the basins, gives the whole the appearance of a cascade.

You all know how shallow water running over a surface ripples into waves. Now, wherever this water runs it seems to deposit, in regular layers, the material which it holds in solution. The consequence is, that it forms on the surface beneath an exact representation of the rippling waves; just as you would take a plaster cast of any solid substance. It is, in fact, to the eye, solidified running water; actually a cascade turned to stone.

As a proof that this picture is not exaggerated, let me request you to test it by looking on a photograph of the original, of which many have already been taken. The lighter parts are either very recent formations, with no water on them, or they are now actually forming, with water running over them; and yet your eye cannot detect which is water and which stone!

But, beautiful as these photographs are, they cannot give you an adequate idea of the splendid sight, for they leave entirely out the magnificent colors which are deposited by the water, as it runs, with all the varieties and brilliancy of the rainbow.

Seeking a place where the inclination is not so steep, we climb up to the top of this grand cascade, crushing thousands of beautiful forms at every step, and passing a spot where some enterprising individual has placed a trough for the water, and built a shady arbor that he might enjoy a shower-bath. He was careful, however, to select a place so low down that the water, exposed to the cooling effects of the air, would not render parboiling probable. Here you can take a bath of any temperature to suit your fancy, for if it is too hot you can, like the thermometer, go lower; and if too cold, higher.

Arrived on top, a sight meets the eye far more wonderful than anything we have yet seen. This plateau is one vast system of pools of boiling water, spouting up here, bubbling there, and smoking everywhere. This one next to us is probably thirty feet across; the water is a bright, clear blue. It has formed a break through the edge of its basin, and is rushing in a torrent into the next one, through an opening richly tinged with red, brown, and other colors. Its waters, mingling with those of the other, form a dark saffron; whilst beyond is a third pool, of a bright yellow color, from the sulphur with which the water is impregnated. Now, imagine every possible shade of color between those I have mentioned, all rippling in the moving water, and reflected from the bright, smooth edges of

the basins, and you may be able to form some faint idea of the exquisite beauty of the picture.

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I might detain you here for hours, telling of the ever-increasing wonders and beauties to be seen at every step about this enchanting spot. Of the wonderful crystalline caves, once filled with water, but now empty; of places where, away down deep in the bowels of

the earth, you can hear the gurgling of rushing subterranean waters, of the "Bee-hive", where, on the top of a raised mound, are found fifteen or twenty holes, of all sizes, from each one of which rushes steam, mingled with hot water, as if from the stop-cock of a steam-engine; making a noise not unlike a swarm of bees.

But we must turn our backs upon the Frozen Cascade, or we shall have no time to see the other wonders of the Yellowstone. You will see no greater wonder than this, however, during the trip.

Travelling south, up the eastern branch of Gardner's River, — passing a beautiful fall by the way, — we reach a high plateau, the trail across which leads to the Yellowstone River, near the mouth of Tower Creek. We rise a gentle slope, and look down once more into the valley of the Yellowstone. Beyond is a mass of broken mountains and tall peaks, between which great, dark, rough gorges sink down into the surface of the earth. Directly before us, and on the other side of the river, is the east fork of the Yellowstone, near the mouth of which is the only bridge which has yet spanned the virgin waters of that river. The bridge was built by the miners, to reach the gold-fields lying on the headwaters of Clarke's Fork of the Yellowstone. The trail now leads up through a rugged, wooded country, where our poor pack-animals stumble about through the fallen timber in a way which threatens to unseat their packs. Suddenly the faint trail leads you out upon a rocky point, where you dismount in alarm on finding that the trail terminates at the edge of an overhanging rock, with scarcely room for you to stand. Far, far beneath you rolls the magnificent Yellowstone, where it issues from the Grand Cañon; whilst right under your feet, at the base of the giddy height on which you stand, rushes Tower Creek, on its way, amidst tower-shaped masses of rock, towards that leap which it takes before throwing itself into the larger stream. This fall, and the "Devil's Den", just above, it is well worth your while to stop and see.

By the way, I have never yet been able to account for the disposition shown to name so many beautiful places after the Devil, unless on the presumption that he has the exclusive right to every thing in the vicinity of hot water, — an admission I am not willing to make; for, although we got into plenty of hot water on the trip, we saw nothing of the Devil, and had very little time or disposition to even think of him whilst contemplating the beauties placed there by the All-beneficent Power.

Our route now leaves the Yellowstone again, and, climbing up out of the deep valley of Tower Creek, we reach a high, rolling plateau, with Mount Washburne, partially covered with snow, away off to the south. Up into this snow-region we climb, crossing banks still ten and twelve feet deep; and, working our way along the mountain-trail, steep and rugged in places, and sometimes covered with both standing and fallen timber, we reach a summit, and look down into the Yellowstone Basin,—the far-famed lake glistening in the distance.

We had been told to follow the southern face of Mount Washburne to get a fine view of the Grand Cañon and the Great Falls. We did it; but my advice to you, when you go there, is, *not* to follow our example; for, although we spent about six hours climbing over and through thickly-fallen timber and reached the edge of the Grand Cañon several times, we did not find any falls—except those we got ourselves over the slippery pine-logs.

The evening we camped in that vicinity, myself and a companion—guns on shoulder—took a stroll through the silent woods in search of game. We did not find much game; but, as we cautiously stepped through the gloomy forests, with our eyes and ears both on the watch, the latter were struck by a sound which produced that peculiar sensation along the back-bone, and that characteristic movement in one's hair, apt to be the effect of the passage of a two-hundred pound shell within a few feet of your head. Hark! what is that? We both hold our breath and listen. It is repeated, seemingly close at hand. A "grizzle", suggests my companion. The idea is far from pleasant; and we are far from camp. Each one instinctively picks out his tree. A tree is a good thing to have about when such visitors are around. But before committing ourselves wholly to a precipitate retreat, we listen again, and find the sounds occur at regular intervals. A light breaks in upon our fear-stricken imaginations. A "mud volcano" is suggested; and, grimly smiling at the idea of climbing a tree to avoid *that*, we push ahead in the direction of the sound, which now grows louder and louder; and, intermingled as it is with that hissing sound familiar to every one who has ever been in a large railroad depot, all fears of bear vanish.

We reach an open space, and there, at the foot of a hill, is our first mud volcano, bubbling always, and every now and then, with a dull thud, throwing its thick, muddy water six feet high; whilst above, on the hill-side, a dozen or more apertures hiss out their

angry steam, reminding you, by the sound, of a consolidated-rail-road depot at a busy hour of the day.

The next morning we resume the march, each of the party with a disappointed air; for we believe we have missed one of the principal objects of the trip, and are leaving the Great Falls of the Yellowstone behind us. We continue to wind our way through the thick timber, and, although there does not appear to be much air stirring, our ears catch a sound which at first we take for the sighing of wind through the pine-tops. As we proceed, however, this grows louder, and the rumble of distant thunder is suggested; but as we reach an open space the sound comes from the left, and a joyful cry bursts from the whole party: "The falls! the falls!!"

Dismounting, we hurriedly push through a strip of timber, reach the edge of an immense great chasm, and there before us is the splendid spectacle. At first we gaze in silent amazement; then, as if the immensity of the scene, the loud thunder of the falling waters, and the contrast to the quiet which had lately reigned around us, invited the outburst, each one gave utterance to a loud yell of excitement, and pushed forward to get a better view.

Within rifle-range of us, and somewhat below the point of rocks on which we stand, the noble stream dashes through a deep, rocky gorge, whose steep, black sides bespeak their volcanic origin. The water, although moving with a rush, is not lashed into foam, but moves to the very edge of the precipice, with its characteristic sea-green color. As it plunges over, the whole mass is at once transformed into a pure snow-white. Down, down, down, three hundred and fifty feet, it goes into the depths below, the spray becoming finer and finer as it falls, until, where it strikes the bottom with a roar of thunder, the whole is veiled with a thick mist, which, in rising, catches the sunbeams, and spans the chasm with a bright bow. The bow seems to reflect the colors which, on both sides of the cañon below the falls, light up and beautify the disintegrating slopes, from the deep-green pine-forests above, down to the very edge of the water, which, looking like a waving ribbon of green flecked with pure white, rushes along far beneath our feet.

Above the falls all is dark, sombre volcanic rock, crowned with dense pine-timber. Below and throughout the whole of the Grand Cañon, extending from twenty to thirty miles from the falls, the steep slopes, from the black rock above to the green waters below, are of a Milwaukee brick or cream-yellow color, streaked with all

the brilliant hues of the rainbow. The effect of these colors is beautifully brought out, and not at all exaggerated, by the brush of Moran, in his fine painting of "The Falls", which decorates the head of the Senate stairway in the Capitol at Washington.

A quarter of a mile above the Great Falls, in a bend of the river, are the Upper or Lesser Falls,—one mass of milk-white foam falling 125 feet; and above these, peacefully and quietly, through beautiful green meadows, the waters flow; where, some of these days, steamers will ply, freighted with passengers, from the Great Falls of the Yellowstone to the lake above. For thousands of years (how many thousands, who can say?) these falls have been working their way back to their present position, and in the course of ages the water has worn out the Great Cañon of the Yellowstone, some twenty-five or thirty miles in length, from its mouth, near Tower Creek, to the present location of the falls. Like the falls of the Niagara River, they will eventually work their way back to the waters of the lake above, and drain it. But this will not be in our day.

Through the smiling green meadows we pursue our way up the river. They are crossed now and then by bright streams of water, one of which, our map tells us, is called Alum Creek. As we cross this, one of the party pretends thirst, and, handing his cup to a servant-boy, asks for a drink. He is asked to try it himself first to see if it is cool. He does so, and, with a cry of disgust and an expression of face which reminds one of younger days and green persimmons, ejects it from his mouth. It is a bitter saturated solution of alum.

At a short distance beyond, we scatter to look at a number of large boiling springs. Standing by the largest one of this group, you might very naturally, from the noise made, fancy yourself in the room of a high-pressure engine; and hence the name given to it, "Locomotive Jet". The imitation of the impulsive puffing, and noise of wheels turning in water, is perfect. The aperture of the jet is about six inches, is in a kind of raised chimney, and all round it are numerous small vents, each one most elegantly lined with bright-yellow sulphur. In the springs, where sulphur exists in the greatest abundance, the beauty of the scalloped edges, bordered by pearl-like bead-work, and colored with every tint, from a deep, rich yellow, through straw to a delicate cream, is something beyond the power of words to describe. These colors in the embossed edges of the pools, mingled with the pure white silica which forms the

base of the structure, and the bubbling-up of the bright, clear azure waters, formed a picture about which we lingered until the sun had sunk behind the western hills, and we woke up to the fact that we had wandered from the trail, which had to be recovered before night should overtake us. After considerable difficulty this was done; but in the process one of the party gets separated from the rest, and whilst seeking for hotel-accommodations alongside of a hot spring (for the night is cool), trying to pick out one which does *not* look like a geyser, our pistol-shots call him to camp on the river-bank. Here a supper of hot trout sends him to his blankets to dream of Evert's fate, and of the worms in the lake-trout, which his hunger made him forget.

The next day (the 8th day of August), we saw our first mud geyser, and waited for three hours, in a storm of rain and sleet, to see it "go off". Some of Prof. Hayden's party were encamped near by, taking observations of the geyser; and, as the hour approached for the eruption, the whole party assembled around the rim of the basin to witness the phenomenon. The basin is oblong, thirty by fifty feet, six or eight feet deep, with a channel leading to the river, to carry off the surplus water. The bottom is covered with muddy water, which, at one point, is slowly bubbling up through a crater, the rocky edge of which can be just seen above the surface. The eruption takes place very regularly once in about three and a half hours; and as our watches pointed to the hour the water in the crater suddenly commenced boiling violently, rising and concealing the rim of the crater. "There she goes!" and with the words—a dull, heavy sound, and a hiss of angry steam—the column of muddy water shot up into the air ten or twelve feet, and fell back like a graceful fountain. Again and again the explosions took place, throwing the water sometimes higher, sometimes not so high, and filling the air with dense masses of steam. Sometimes several of the jets in succession would be lower than usual, and then again, as if having gathered strength for the effort, and the demon below were determined to outdo himself, the column of water would rush into the air at an increased height; and each time the effort was increased the effect would be greeted with a cheer of applause by the lookers-on, as though some great animal were performing feats of strength before an audience. Suddenly the explosions cease; the water, no longer thrown out in a jet, boils violently, but gradually recedes until it settles down inside the rim of the crater in a

simmering state; the surplus runs off through the drain, or flows back into the crater, and the geyser is quiet again for three hours. Not far from the mud geyser is the spring which has been named the Grotto, where a vast column of steam issues from a cavern in the side of a hill with an opening five feet in diameter. The roaring of the clear waters in the cavern, and the surging of the waves up to the mouth of the opening, remind one of the surf on the sea-shore, although but very little water is thrown out. So hot is the steam from the mouth of the Grotto that it is only when the wind wafts aside one dares to look in.

Close-by, but higher up the hill, is the Giant's Caldron,—a great conical basin, forty feet across at the top and thirty feet deep,—where a dense column of steam is constantly escaping with a roar which shakes the ground for a considerable distance around. When the wind blows the cloud of steam aside you look down upon a mass of thin mud, boiling violently like an immense caldron of mush. At times it must act with still more violence, for the trees standing around within a radius of one hundred feet or more are bespattered with mud to a height of seventy-five or one hundred feet; and this kind of an explosion has evidently occurred within a year or two, for some of the trees are still alive.

In this same group of springs are places which would delight a brick-maker or a pottery-manufacturer: great tanks of boiling mud, where the materials have been mixed, probably, for thousands of years, until they have become as smooth and soft-looking as silk. In places the process has gone on until the mud has become so thick and heavy that the rising steam seems to have just enough power to push it up like a blister and break it with a puff; whilst in others, where more moisture remains, the blister forms quickly, the bubble bursts, and the soft mud sinks down again into the mass, forming beautifully accurate rings, to be succeeded immediately by other blisters, other bubbles, and other rings.

In another location, at the hot springs near the extreme western point of the Yellowstone Lake, we witnessed a beautiful modification of these mud springs. Close to our camp was a space, some fifteen or twenty feet in diameter, thickly studded with mud vents in a more active state than those just described. Here the mud, in place of being in tanks, was piled up to a height of several feet, forming a cone-like structure around each vent. Every moment a puff of mud would dart up, like the star from a Roman candle, and, with pretty much the same kind of a noise, fly two or three feet in the air, and falling in the face of its next neighbor, be in turn

ejected from that, and so on, in a way remarkably suggestive of the science of politics. *This* mud, however, was clean, and beautifully tinted with blue, pink, olive, straw, and yellow colors; so that, at a short distance, the whole mound looked like a great pile of variously colored cream-candy.

Standing by the side of this active little machine, away up here at the top of the continent, we could not help playfully fancying each pellet of mud a vote, and thinking what pyramids of majorities would be piled up in the coming election in favor of one whose purity of character it has been impossible to cover up by all the showers of mud which have been hurled at him.

All these vents are, however, not of the same force of activity. In some of them the escaping gas has just force enough to raise the stiff mud, forming the blisters and rings just described; others, where the gas is more active and the material more pliable to deal with, throw the mud up several inches in height, and, in breaking through the top, is divided into several parts, and these, curving outwards, form structures precisely like the beautiful flower of the tulip supported on a slender stem. These sink down slowly enough to enable one to observe the exquisite form and color; and as they disappear in the mass, up come other puffs, and new tulips are formed and disappear in succession, so that one may stand and look at mud tulips all day long. One is tempted to gather a bouquet of these beautiful flowers; but a brick-mould would be the only practicable means of pressing them, and with that machine we were not provided.

What I have just described is found upon the extreme western shore of the lake, where, for a mile, the whole space is occupied with an innumerable number of springs of all shapes, sizes, colors, and temperatures; and even down in the edge of the lake itself the bubbling of the water shows the existence of springs beneath. In one or two places these springs have, by the deposition of materials held in solution, built up cone-shaped structures above the level of the lake-water. One of these is a short distance from the shore, the intervening space being bridged over by a log. Crossing this, I seated myself on the cone, and, had I been disposed, could have dipped my foot in the cold waters of the lake, and put my hand in boiling water behind me; but I did not try it.

We were warned before visiting the Yellowstone region that, if we had any regard for our character for veracity, we would say nothing after we got back, for nobody would believe what we said.

I will plead guilty to the charge of having quietly smiled at the many wonderful tales I had listened to of the sights that were to be seen there.

Among these was one which excited my piscatorial curiosity. It was said, you could catch a trout in cold water, and, without moving from the spot or taking it from your line, transfer it to a boiling pool, cook it, and eat it whilst still on the hook. I am free to admit I did not believe this story, and I do not ask you to believe it; I will simply tell you what I did.

Throwing my line into the lake, I soon captured one of the many large trout which could be seen lazily floating about in the clear water. When I had landed him, I stepped back a pace or two, to a boiling spring, into which I dropped him, still on my hook. In the spasm of his instantaneous death he broke loose from my hook and disappeared. I was not very hungry at the time, and, in consequence of that, and his disappearance, I did not eat him; but I submit I demonstrated the practicability of the feat.

As we travel along the shore of the lake our attention is attracted several times to a long spit of level sand, stretching from point to point, across some of the inlets of the lake. These, on a small scale, are the secondary shores described by Elisée Reclus, in "The Ocean", as constructed on the line of equilibrium between the marine and fluvial waters. These sandy causeways rise but a few inches above the surface of the water, — thrown up on the one side by the gentle waves of the lake; arrested on the other by the accumulation of water from streams flowing down from the surrounding country. At one end of these causeways a deep channel is always found, by which any superabundance of water from behind the causeway can escape. Ample evidences were seen to demonstrate the existence of these secondary shores in a former age, when the lake was at a higher level; for, as we proceeded, we now and then entered upon marshy ground, which was best avoided by keeping close to the lake-shore, where the footing was comparatively dry and sandy. In the course of time, as the lake receded, the space behind these sand-pits was filled up by the sediment brought down by the tributaries; but the water, which continued to accumulate, was prevented from escaping by the solid bars of sand; and bogs were formed, into which our horses sunk as we tried to push through them. The ancient sand-pits near the lake-shore were solid enough; but the main difficulty was, that the whole space had been covered with several generations of trees, — one of which was

standing, and the others, in a tangled mass, lay rotting on the ground. Through these masses of fallen timber we were obliged to twist and turn in every direction; sometimes becoming so involved as to render no escape possible except by taking the back track,—only to become involved in other, perhaps worse, mazes of timber.

But few handsomer sights can be seen than the one from these hot springs, on the western shore of the lake, especially when viewed just as the sun is beginning to peep above the snow-capped peaks to the east, breaking through the heavy bank of fog which the morning always finds there, and lighting up the great stretch of water beneath. Far off to the front, right and left, extends the surface of the lake,—a wide band of glorious reflections bisecting it from east to west. A few gulls and great pelicans sail slowly through the air, or float lazily on the water, gently rocked by the ripples raised by the morning-breeze. Here and there along the shore rises a column of white steam, as if some engine were just firing up; whilst far away across the lake "Steamboat Point" looms up, looking, for all the world, like a great dock in some busy port, with half a dozen steamers waiting there and blowing off steam, preparatory to a race around the lake. With a little help from the imagination you can easily fancy yourself waiting here for one of those steamers to pick you up on your way down to the Great Falls. With a little more, you are able to see in your mind's eye the steamer come ploughing through the water and up to the dock, built out (we will say) from one of those cone-shaped structures, containing hot springs, which I have described. Let us pursue the fancy to its possible crisis. As you and a crowd of fellow-passengers rush along the narrow structure,—each seeking to be *first*, as is usual in America,—a loud scream pierces the air, and, before you can interfere to prevent it, your wife's favorite lap-dog—or preferably somebody else's wife's favorite dog—is being rapidly converted into soup far down in the boiling caldron beneath your feet.

Turning from this painful picture, we face westward, and, plunging into dense forests, travel for hours, winding our way up hill and down, through thickets of standing pine, or winding about through masses of fallen logs, and trying to keep, according to direction, a due-west course by the compass. Under the circumstances, this is pretty difficult to do. This is, however, the only course to pursue, for although there are plenty of trails, they are old game-trails, and run in every possible direction except the right one. When inquir-

ing about the trail on this part of our trip, we were told by an old mountaineer that every one who went through made his own trail; and this we found to be literally the fact,—not *always* the case with reliable Rocky Mountain guides.

Our compass, however, was a good one; and, in the course of twenty miles or so, we reached a break in the timber, and entered a pretty little valley, with a bright, clear stream flowing south into Lake Madison, then in full view, nestling in the midst of high hills, and gayly sparkling in the sunlight.

One fact of interest regarding Lake Madison may be mentioned. Until last summer this lake had been supposed to be the headwaters of the Madison River, which, you will remember, is the middle branch of the Missouri. Situated on the eastern slope of the continent, no one ever dreamed of its waters flowing in any other than an easterly direction; but Prof. Hayden's explorations of last summer demonstrated the remarkable fact that the waters from Lake Madison actually cañon through the main divide of the Rocky Mountains, and flow into Snake River, and thence by the Columbia to the Pacific Ocean.

The hills which intercepted our westerly course look steep, rugged, and formidable; and in an evil moment we decide to deviate from our course, get a good look at beautiful Lake Madison, and work round the end of the range along its shore. We did *work* round the edge of the shore, through dense masses of fallen timber and marshy ground, only to find we still had the rough, rugged hills to surmount; and to escape the difficulties along the shore we flew to others we knew not of, and climbed the face of a mountain where, I am satisfied, nothing but a mountain-sheep had ever been before, and, after hours of hard climbing, reached a precipice on the opposite side, down which the most sure-footed of domestic animals could not have made his way. We did not attempt it; but, after a considerable détour, reached a game-trail, and succeeded in picking our way to the bottom,—too late in the day, however, and too much exhausted to reach the geyser-basin that day, as we had hoped.

The next morning we reached Fire-hole River,—a fine, bold, dashing stream, filled with beautiful falls and rapids. Following this down for some distance, still in dense timber, we at length reach an opening, and there before us lies the upper geyser-basin. Through the middle of it flows the rapid river, while on each side, as far as the eye can reach, and away above the trees to the right, where the stream bends and disappears, the air is filled with white

columns of rising steam;—some large, some small,—looking, for all the world, like a valley filled with busy steam-engines.

Our camp is soon located on the edge of the timber, and, then, map in hand, we wander about to see the wonders, locate the principal geysers, and wait for an eruption. The “Giantess”, “Castle”, and “Old Faithful” are all in sight; the last two on the other side of the river. “Old Faithful” is directly opposite our camp. The “Giantess”, is the nearest one, and we approach her with a certain amount of awe; for we have been told that she throws a column of water two hundred and fifty feet high, and a waterfall of that size ought to be approached with awe. She is quiet enough now, however; and, walking up the gently inclined slope of the surrounding cone, we approach the edge of her crater. It is eight or ten feet across, filled to the brim with bright, blue water, gently boiling and throwing off a light cloud of steam. Standing on the very edge of the projecting rim, you look down through the pure fluid into an unknown depth, nervously starting back, now and then, as the water in the centre of the basin suddenly boils up a foot or two in height, making a noise like the revolving wheels of a steamer when lying at her dock.

From your slightly elevated position on the cone of the “Giantess” look around you. Boiling springs of all sizes and shapes are scattered in every direction. Every now and then the water in one will start up as if new fuel were being piled on the fires below, and after bubbling furiously for a few moments, throwing the water to a foot or two in height, sink back to its normal state; then another and another will break out; and so on through the whole group. Looking down the river, “The Castle”—a structure eight or ten feet high, and formed apparently of white marble—appears to be in an almost constant state of eruption, throwing the water far above its top, and the dense steam to an immense distance above that. Between us and the river stands “The Bee-hive”,—a structure of that form,—down the interior of which you look into a caldron of boiling water, starting back as it seems to redouble in violence, for it is a geyser, and liable to go off at any moment. As you ramble farther on towards the river, look before you step, for I came near walking right into a pool on a level with the surface; and started back as I looked down through the bright, clear water into an unknown depth. Wandering thus, discovering new beauties and new wonders at every step, I had waded the shallow stream to explore on the other side, when I was startled by a loud shout, and,

looking up, saw the whole party running to the high ground, and evidently in a great state of excitement.

Not knowing whether — as the French express it — “the matter in question was” a second deluge or the inopportune appearance of a grizzly bear, I rushed to the high ground on my side, and soon almost ran against the cause of all this turmoil.

“Old Faithful” — so called by the early explorers on account of his working so faithfully at periodical intervals of about an hour — was just beginning to spout hot water and dense steam. Higher and higher rose the ejected column; more and more rapid became the throes of the fire king below, until the dense masses of steam, rising hundreds of feet above, entirely hid the column of water except near its top, where it turned to fall in a graceful shower upon the marble-white base below.

Charmed by the beautiful spectacle, and emboldened by that familiarity which is sure to produce confidence, I approached, step by step, until I stood almost under the spray of the falling waters. Weak words fail to describe the beauties surrounding the mouth of “Old Faithful”.

At the highest point of a gradually rising and irregular slope stands the marble-like structure, a few feet in height, from the inside of which the water and steam gush forth as if impelled by successive explosions of gunpowder. The tube, inside as smooth and polished as glass, is outside made up of the most beautifully sculptured forms, and from the base of this gently slopes off a system of tiny little basins, such as I have described as existing at the hot springs or “Frozen Cascade”. Into these basins the ejected waters fall, flowing gently off from one basin to another. I should judge pure sulphur to be present in the water; and of all the delicate shades of color I ever saw, those existing in the basins around “Old Faithful” take the palm.

The colors are the most exquisitely delicate that can be imagined. The bottom of each little basin is colored with the different tints ranging from a deep-yellow brocade silk near the crater, lighting, as you recede, through light-yellow and straw down to a pure white in the most distant ones.

Time and time again did this glorious “Old Faithful” present this magnificent spectacle to us during our twenty-four hours’ stay; and even in our dreams we could hear through the night the old fellow spouting out his glories, when there was nobody to look on except the silent stars above.

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As a shocking instance of the descent from the sublime to the ridiculous, I will mention the fact that, after looking at this splendid display of nature's magnificent water-works, my attention was directed to a party of soldiers assembled around a fine boiling spring, whose bubbling waters looked white and frothy. The men were engaged alternately poking in and pulling out long sticks, to the ends of which were attached articles looking like immense mops, all of them—the soldiers, not the mops—apparently in good humor. Our trip for ten days previous had been very hot and dusty. There are no washerwomen in that country. The men had thrown in a bar of soap, tied their shirts to long sticks, and Madam Nature was called on to act as laundress. She did it very effectually.

Of course, every one in the party looked forward anxiously to the pleasure of seeing the "Giantess" display herself; but, with the proverbial fickleness of her sex, she seemed determined to postpone her favors till the latest possible moment, and we retired for the

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Americans are sometimes accused of being afflicted with a boastful spirit; and, whilst willing to admit that the charge is not entirely without foundation, I can readily see how any one raised in this great Western world of ours might very naturally feel some apprehension about going out at night in England, lest by some accident he should *step off*; or imagine that one used to wander through these snow-capped Rocky Mountains should reply as the American did who was asked, after crossing from France to Italy, how he liked the scenery in the Alps: "Oh, yes; the Alps. Well, now you remind me, I believe we did cross '*rising ground*'."

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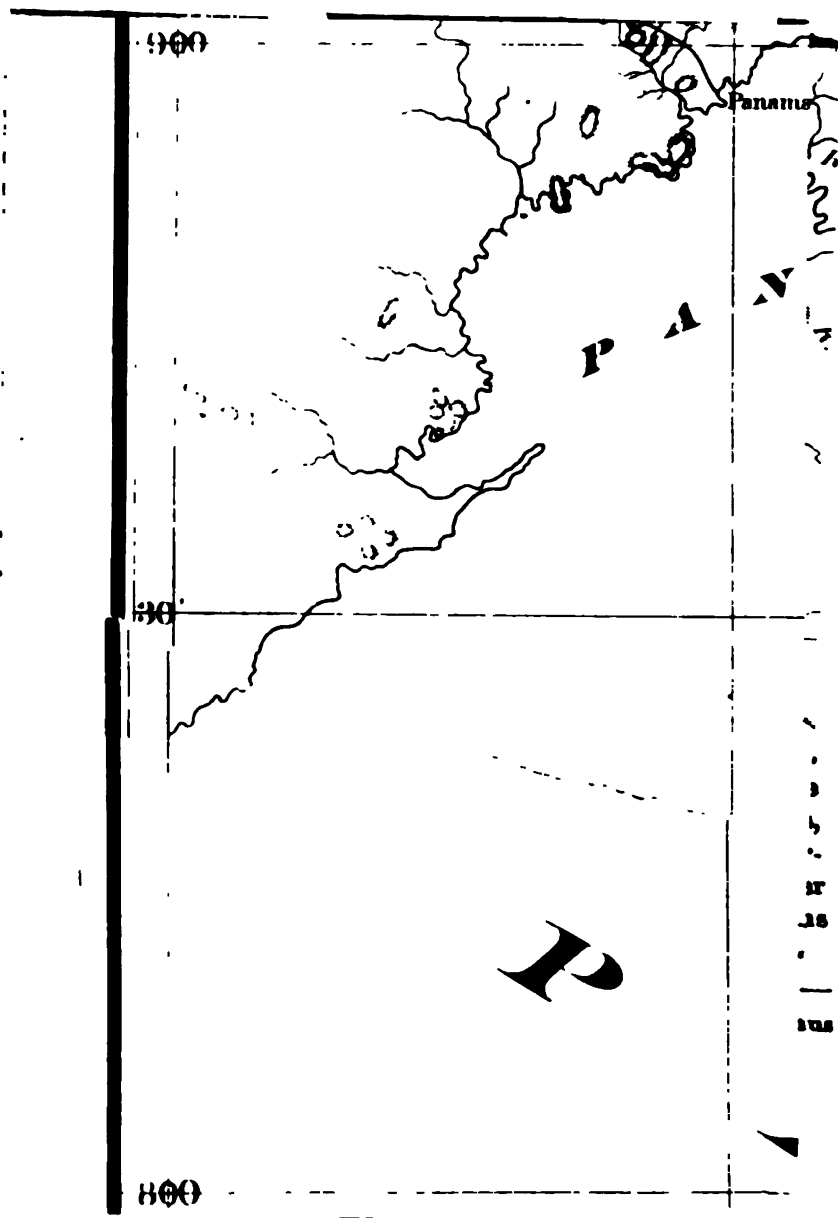
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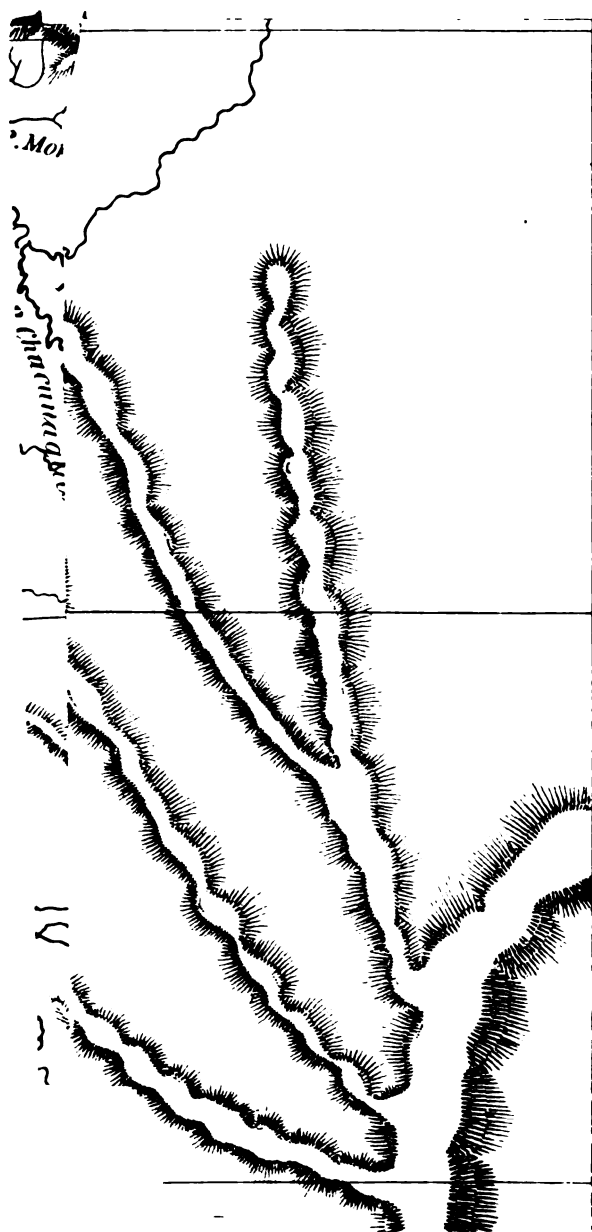
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In view of the formidable nature of the undertaking, it is not, perhaps, surprising that the realization of the canal-project should still be in the future; but that the limited region which alone could afford a solution of the problem of its practicability should so long have been allowed to remain unexplored, is inexplicable. Strange as it appears, however, it is nevertheless strictly true. Six years ago "the territory of the Isthmus of Darien east of the Panama Railroad was almost a *terra incognita*", and, according to most excellent authority, "there did not then exist in the libraries of the





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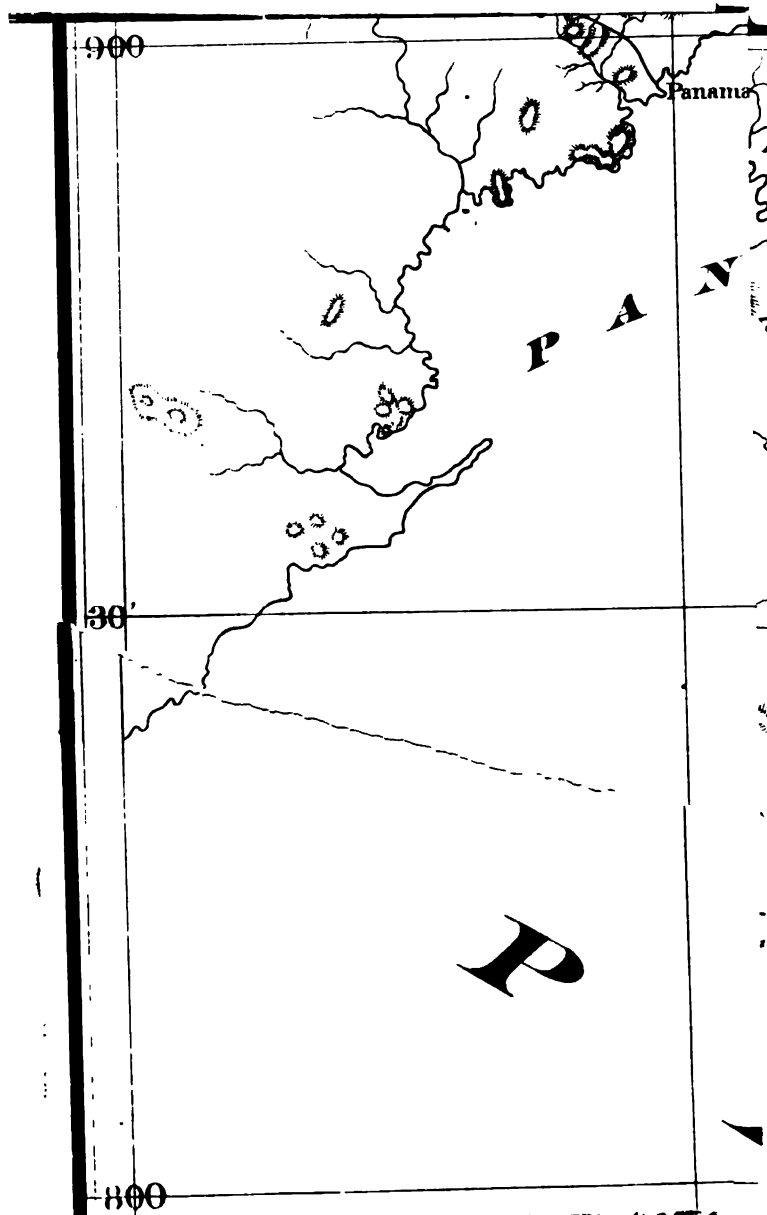
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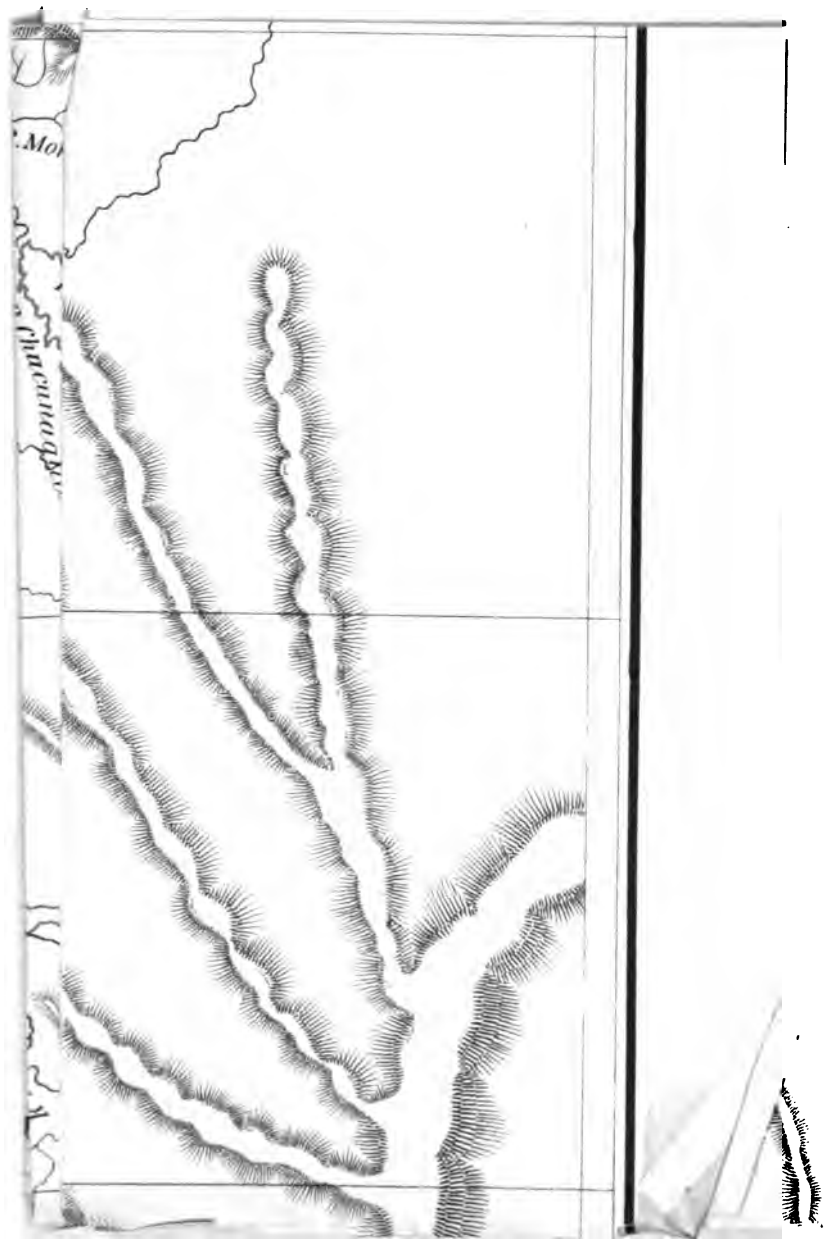
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With reference to our survey of this route Capt. Selfridge says:

"The principal rivers flowing into the Gulf of San Blas are the Mandinga, Nercalagua, and Carti. The Mandinga is the largest river on the Atlantic coast between the Chagres and the Atrato, and our main survey was carried up the valley of this stream. The Nercalagua, being in a more direct line, was also levelled up some sixteen miles to its sources. I will not enter into the details of these surveys; they were carried forward to a successful end in spite of the very heavy rains during the month of May, the fall of which was greater than ever known before by the oldest inhabitants of the isthmus at that season. The lower portion of the bottom land of the Mandinga became a vast swamp with from two to six feet of water over it. In some places one would sink to the waist in mire. Small streams became rivers only passable by swimming; our bridges were swept away, and it even happened at times that the rise of the water was so rapid as to compel our people to take refuge and pass the night in trees. Happily the waters would subside rapidly, enabling us to continue after vexing delays; each rise leaving the country in a worse condition than before. Our animals were useless in such a state of affairs, and provisions, after being sent forward in boats as far as they could be forced against the swift current of the river, were carried on men's backs over miles of country where their path led over steep and rocky hillsides, slippery from moisture, and through streams and swamps. The survey crossed the 'divide' on the seventh of June with an extreme elevation by level of 1,142 feet. * * * The objective point, the junction of the **MARMONI** and **SAN JOSÉ** rivers, the same reached by Mr. Kelley's engineers, was attained. The latter's survey was found to vary but half a mile in position—an excellent verification of its correctness, as it started from the Pacific shore more or less in error, while the initial point of our survey was absolutely determined by astronomical observations.

"The magnificent harbor of San Blas, the shortness of the route, and the general appearance of the interior from the sea, all gave great hopes that we should here find the favored spot for the successful accomplishment of our mission. But the prosecution of the survey, though it showed a more gradual rise to a certain distance than other routes, developed an altitude that it would require tunnelling to surmount. * * * An inspection of the profile gives us a tunnel of ten miles as necessary to span the intermediate distance between the elevations of 190* feet on each side: after this the excavation would not exceed, for the remaining sixteen miles, an average depth of over sixty feet. A tunnel of ten miles, however, would involve for this line, otherwise so prepossessing, an expenditure too vast for me to pronounce it practicable."

We experienced from the Indians who inhabit this region none of the hostility of which, as before mentioned, some previous

* Capt. S. takes the general ground that tunnel work will be cheaper than an open cut of more than 190 feet. These views were somewhat modified in the case of the **NAPIPI-DOGUADO** route, on account of the extremely rapid rise of the dividing ridge at that point. See estimates for that route given further on.

explorers had complained. On the contrary, they appeared to regard us with no dislike nor suspicion, never watching our operations on shore, and venturing freely on board our ships, where they showed no little sagacity in turning honest pennies by the sale of bananas, plantains, and pine-apples. They are, I think, the finest race, in every respect, to be found upon the isthmus, and, though rather undersized, they have a frank, manly bearing that is very engaging.

They do not dwell inland, but, exhibiting great good sense and taste, have fixed their habitations upon the beautiful coralline islands which stud their splendid gulf. There, shaded by graceful cocoa-nut palms, and fanned by fresh breezes from the sea, they enjoy a cool, delightful climate hardly known elsewhere within the tropics. As these islands are barely sufficiently large to contain their houses, they are obliged to resort to the main land to find room for their plantations, and there in the fertile valleys of the Mandinga and Nercalagua they raise, with little labor, an abundance of the tropical fruits that are with them the 'staffs of life'. This insular mode of life seems a feeble image of that in Venice, the place of the sombre-hued gondolas being here taken by light and graceful canoes, hollowed from single logs, in the management of which the Indians are no less skillful than their more famous brethren, the gondoliers, so long celebrated in song and story.

Let us now turn our attention to the next in geographical order, the Darien route proper. The commodious harbors presented at either end of this line by Caledonia Bay* and the Gulf of San Miguel, early attracted the attention of those interested in the canal scheme, and many attempts have been made to discover a route by which it might be possible to connect them. But it is unnecessary to enter into the details of these explorations. The thrilling story of the sufferings of Strain and his heroic companions in their ill-starred attempt in 1854 must be fresh in the minds of many of you, and it is sufficient for our present purpose to say that all explorers, except one, had united in condemning the route. The information

* This name was conferred by a colony of Scotchmen who, under the leadership of Wm. Patterson, and the auspices of "The Company of Scotland, trading to Africa and the Indies," settled here in 1698. They were on good terms with the natives and flourished for two years, when they were obliged to abandon the settlement on account of the hostility of the Spaniards and want of support from England. The bay and the country thereabout they called *Caledonia*, and the settlement was known as *New Edinburgh*. Burney's "Pacific Ocean," vol. IV. part II.

obtained by them, however, was not sufficiently extensive and definite to settle the question beyond a doubt, as is proved by the fact that the pretended discoveries of that one—Dr. Cullen—were, as late as 1867, considered worthy of serious attention.

This extraordinary individual, professing to have crossed several times directly between Caledonia Bay and the Gulf of San Miguel, published a work descriptive of his remarkable journeys and discoveries. Estimating in this the cost of a canal by his route with the greatest nicety, and illustrating it with a bird's-eye view of the work as it was to appear when completed, with the largest steamers rushing through without let or hindrance from lock or tunnel, he made a profound sensation. So profound, indeed, as to deceive to a considerable extent even the most learned geographers, by whom he was awarded great credit for his discoveries; although it appears that his statements were always received with considerable allowance, as being unsubstantiated by reliable notes and records.

A comparison of his description of a remarkable depression in the Cordilleras near Caledonia Bay, with the facts, will show the limited foundation of fact upon which rested the doctor's grand superstructure of fancy. He says:

"From the sea-shore (Port Escocés) a plain extends for nearly two miles to the base of a ridge of hills which runs parallel to the coast, and *whose highest summit is about 350 feet*. This ridge is not quite continuous or unbroken, but is divided by transverse valleys through which the Aglaseniqua, Aglatomate, and other rivers have their course, *and whose highest elevations do not exceed 150 feet*. The base of this ridge is only two miles in width, and from its south side a level plain extends for thirteen miles to a point on the Savana river called *Cañasas*, which is about twenty miles above its mouth."

Now, had this been true, the canal question would have been most completely and satisfactorily solved, and further search worse than useless; but, unfortunately, it is not true, nor is it even approximately correct. The highest summit of the Cordilleras at this place is, instead of 350 feet, not less than 1,500, and the highest elevations of the Aglaseniqua and other rivers on the Atlantic slope would in no case fall below 500 or 600 feet.

Our line of survey crossed the divide at an altitude, by level, of 1,259 feet. This, certainly, does not represent the lowest possible pass; but as the line struck the Sucubdi River upon the Pacific slope at an elevation of 553 feet, we have a right to regard the non-existence of any pass under that height to be incontestibly demon-

strated, else the Sucubdi must flow into the Atlantic instead of into the Pacific.

The following summary from Captain Selfridge's report will convey, as concisely as possible, an accurate idea of the character of this route:

"The Sucubdi with its tributaries, the Napsati and Asnati, drains all the region on the Darien line; its bed, therefore, represents the lowest possible profile. The height of the junction of the Sucubdi and Chucunaqua was found to be, by careful barometrical observations, 146 feet; allowing to these observations the extreme error found by experiment, twelve feet, there will be found a distance of ten miles on the Darien line from the elevation of 160 feet* on the Atlantic to a corresponding height on the Pacific slope; in other words, a tunnel of this length would be required. In addition there would be an average cutting of 130 feet for ten miles or more, and the Chucunaqua to be crossed by a costly aqueduct. The route by way of the Sassardi and Morti presents pretty much the same results. * * * * * An inspection of the profile of this line will show a tunnel of not less than eight miles necessary, beside very deep cutting in the valley of the Sarsardi. * * * No further surveys of these routes can be necessary to give proof of their impracticability."

The inhabitants of this part of the isthmus are divided into small tribes that take their names from the rivers upon which they live. Thus, upon the coast there are the Caledons and Sassardies, and upon the Pacific slope the Sucubdies, Asnaties, Chucunaquas, and Morties. The coast Indians, from their frequent intercourse with traders, are somewhat civilized, but the *bravos* of the interior have never been conquered by the whites, and own no allegiance to any government but that of their own chiefs, chosen according to traditions handed down from time immemorial. Their government is patriarchal in its character, and not hereditary, the authority of a chief passing, usually, upon his death, to the next oldest man: respect for age appearing thus to be one of their most strongly marked characteristics.

They had all been represented to us as exceedingly savage and warlike, it being said that they could muster a thousand warriors who would resist to the last all attempts to penetrate their territory. Whether or not this sanguinary disposition may truthfully be attributed to the Chucunaquas and Morties I cannot say, as our explorations did not take us in the vicinity of their villages, but it is cer-

* 160 feet above plane of mean tide plus 30 feet below for depth of water in canal, gives 190 feet. See previous foot-note.

tainly a libel on the Sucubdies. We went through their entire country, and they appeared to be a mild and inoffensive people—a tribe of farmers rather than warriors, exhibiting the quiet temperament to be expected among peaceful tillers of the soil. Living, indeed, in a country where nature repays the minimum of labor by the maximum of harvest, and possessing none of the artificial wants consequent upon civilization, we should naturally expect to find them indolent and quite the reverse of warlike or aggressive—and such they seem to be.

They are not, however, wanting in intelligence and quick perception, nor in a chivalrous disposition that leads them to succor the weak, admire courage, and despise cowardice. As a case in point: one of our men whom, accidentally and severely wounded, we were obliged to leave among them several days while we were going down the river and returning, was treated by them with the greatest kindness; while another, who, dreading the rough march and possible danger ahead, sneaked from the ranks and started upon his return, was recognized by them at once as a poltroon, and treated, very justly, with great contempt and indignity.

They were not at all in favor of the canal-project, as they were able to comprehend it from their simple stand-point, evidently fearing that, by the advent of strangers, they would be dispossessed of their fair lands, and driven off without just compensation to shift for themselves as best they might. They also expressed great fears lest the canal, should one be constructed, would let the waters of the Pacific in upon them and drown them out. The former apprehension would, I fear, have been only too well justified by the event had their country proved favorable to the enterprise; but, as they live some 500 feet above the level of the sea, the latter would doubtless have proved unfounded.

Some circumstances appear to give the color of truth to the reports of the savage character of the Chucunaquas and Morties. The chronicles of the early Spanish settlers contain frequent accounts of massacres by the former tribe,* and it is reported that they killed a party of rubber hunters who penetrated their country during the

* I am inclined to think that the Spaniards applied the general name Chucunaqua to all the Indians of that region, otherwise the tribe which now bears the name must have been much larger then than at present. The following item, dated Panama, March 22d, 1874, would seem to indicate that this tribe is still inclined to defend its domain with as much spirit as of old. "The Indians of Darien inhabiting the banks of the river Chucunaqua, having refused to allow the caoutchouc-

summer succeeding our visit. The Morties killed four men belonging to an English expedition under Commander Prevost in 1854, and the same tribe made some threats against one of our parties that operated in their vicinity, which, however, they did not attempt to put into execution.

Let us now take up the next in order, the celebrated Atrato-Tuyra Route. The starting point of this, on the Atlantic side is the Gulf of Uraba, or Darien, and the terminus, as before, the Gulf of San Miguel; the Atrato River being utilized as far as the mouth of the Carcarica, whence a cut had been proposed across the country to such a point on the Tuyra as might afford the requisite depth of water.

Concerning this route many extravagant accounts have been published, all of which, it appears, on candid investigation, have but little foundation other than that which existed in the exuberant imaginations of their authors. Not, indeed, that I would deny honesty of intention to the gentlemen in question, for I am well aware that the attempt to gain any idea of those regions, otherwise than by patient and laborious examination with the aid of instruments of precision, is sure to result in the complete misleading of the explorer — no matter how honest his intentions. And, besides, we all know that it is a weakness of human nature to see only what we want to see, and to make our observations agree with our wishes, by dint, perhaps, of rather violent twisting. At all events, it is certain that the favorable reports of this route are entirely erroneous, as will appear by a glance at the map exhibiting the topography of the locality.

You will observe that the Cordilleras of the isthmus sweep to the westward in an unbroken chain to join the coast-range of New Grenada. This portion of the ridge is, indeed, of no great altitude, but it is perfectly well marked and continuous. Our regular survey crossed at an elevation of 712 feet, while, a little further north, Capt. Selfridge found a height of only 400 feet, estimated from rough observations with a pocket barometer. No great reliance, of course, can be placed on those figures thus roughly determined, but there

gatherers to collect that product on their territories, the government sent some fifty soldiers to inquire into the matter. It seems that on the 15th ult. they went up the river and were attacked by the Indians. From news just received, it appears that some sixteen of the soldiers were killed, and the expedition, it is feared, has failed."

can be little doubt that the Pass of Carcarica, as the place is called, is the lowest on the continent, except on the line of the Panama Railroad.

But the utility of this line for canal purposes does not by any means depend on the height of this ridge alone; that is, indeed, of minor importance, for the entire country is filled with hills from the divide itself to the junction of the Tuyra and the Yapé rivers, near which tide ends.

The character of the country is well described by Capt. Selfridge, who, after detailing in his report the results of his extensive explorations in this vicinity, thus sums up the matter:

"As the facts unfolded themselves they caused a bitter disappointment, for I had been led by the appearance of the Atlantic slope, and the reports of those who had visited the Pacific side, to expect a different result. * * * The whole country is a network of hills from the Tuyra to the divide itself, and the high land between the mouth of the Oué and Paya, rising sometimes to 400 feet, was totally unexpected. The long extent of swamp-land on the Atlantic side is another very bad feature of this route. To show its impracticability I have calculated the amount of excavation necessary, supposing we looked up to the mouth of the Oué, which is 160 feet above the sea. It amounts to the enormous sum of 45,711,500 cubic yards earth; 62,185,000 cubic yards rock. Two hundred and fifty millions of dollars would not represent the amount necessary for the construction of a canal by this line."

There now remains for our consideration but one other route within the limits of the isthmus proper. This is known as De Puydt's Route, from its projector, who claimed to have ascended, in 1865, the valley of the Tenela,—a small stream flowing into the Gulf of Darien,—and to have discovered a pass only 153 feet high. Discrediting this report, but wishing, as he says, to leave no doubt clinging to any portion of the isthmus, Capt. Selfridge obtained from a gentleman who accompanied De Puydt his exact route. Following this, the country was penetrated some thirty-three miles. Having then reached an altitude of 682 feet, by careful barometrical measurement, and the mountains of the divide being plainly visible yet higher beyond, the officer in command was compelled to turn back for want of provisions. He had, however, gone far enough for the purpose.

We have now glanced hastily at the various lines that have been proposed within the limits of the isthmus, and, imperfect as has been my sketch, I think you will be willing to concede that this attenuated neck of land presents no route sufficiently favorable to

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the enterprise to be pronounced practicable in the proper sense of the term. Wherever the spirit of adventure may hereafter lead men to look for a canal-route, Darien may, I think, be safely considered as eliminated from the problem. To have achieved this result; to have succeeded in obtaining, often in the face of the most formidable obstacles, accurate information where so many others have sought for it only to fail, cannot, it seems to me, be considered otherwise than as a triumph for our navy of which we all, as Americans, have a right to feel proud. But our explorers were not rewarded by negative successes alone. Their labors, as will presently appear, ultimately resulted in the discovery of a route, not only practicable, but, in many respects, eminently favorable.

The Atrato River, to which I have already referred and which is to play so important a part in the route about to be described, rises in the State of Cauca, in latitude $5^{\circ} 20'$ north, flows in a northerly direction, nearly parallel to the Pacific coast, for about 400 miles, — following the bends of the river, — and finally empties into the Gulf of Darien through a delta comprising many mouths.

It drains a valley of considerable area, bounded on the east by the westernmost branch of the Cordilleras of the Andes, and on the west by a range of low hills rising abruptly from the Pacific shore. The topography of this region does not appear to be generally understood. It is commonly supposed that the Andes are continuous with the Cordilleras of the isthmus; and so, in a certain sense, they are, but the connection is effected only by a range of hills of very moderate elevation. These hills skirt closely the Pacific shore, which is left by the Andes proper at 3° N. The intervening valley affords a double watershed; one to the northward, drained by the Atrato into the Atlantic, and one to the southward, drained by the San Juan into the Pacific.

Humboldt, in his Personal Narrative, called attention to this fact many years ago; but "drawers of maps" seem to have paid him little attention. He says:—

"The erroneous idea which geographers, or rather drawers of maps, have so long propagated of the equal height of the Cordilleras of America, their prolongation in the form of continued walls and ridges, and, finally, of the absence of any traversal valleys crossing the pretended central range, has caused it to be generally believed that the junction of the seas is an undertaking of greater difficulty than there has hitherto been any reason to suppose. * * * The chain of the Andes is divided at 2° and 5° of latitude into three chains, and the longitudinal valleys that separate those chains form the basins of the Magdalena and Rio Cauca. * * * Further west, in the

Choco del Norte, the mountains lower to such a degree, that between the Gulf of Cupica and the Rio Napipi they disappear altogether."

Humboldt, who did not here speak from personal observation, was somewhat misled as to the height of the ridge between the Napipi and Cupica. Hills 600 feet high are, to be sure, hardly worthy of being called mountains, but they certainly form a very sensible line of demarcation. However, as I said, properly speaking, the Atrato lies entirely to the westward of the Andes, having one branch of that range for the eastern boundary of its valley, while the western boundary is formed by the low hills that skirt the coast.

The mouths of the Atrato are at present obstructed by a bar on which there are only about four feet of water; but, within this, the channel is broad and clear, and not less than 28 feet deep at the lowest stage of the river, as far as the confluence of the Napipi. It was surveyed to that point by Commander E. P. Lull, during the expedition of 1871, and last winter the survey was continued as far as Quibdó by Commander Selfridge.

Throughout this distance the Atrato is truly a magnificent river. Its valley, evidently once an arm of the sea, has been gradually filled up by the disintegration of the hills upon either side, and by the decay of the vast masses of vegetable matter that yearly spring up and thrive luxuriantly under the favoring influences of copious rains and a vertical sun. In the lower portion of the valley this process is still going on, and there are vast swamps, extending for miles upon each side of the main channel, filled with the coarse gramalote grass, growing in many places so thickly as to prevent the passage of boats, and presenting the appearance of an immense meadow: yet underneath a deep, strong current sets steadily seaward.

It is not, indeed, before reaching the village of Sucio, some sixty miles from its mouth, that firm banks will be found to the Atrato; but beyond that point they extend in unvarying monotony, ten to twelve feet high, and without a sign of a hill or highland in any part. On both sides of the river stretches a level country covered with an unbroken forest, filled with precious woods suitable for the builder and the cabinet-maker, and with rubber trees and valuable dye-woods of various sorts. These forests must some day constitute an important element in the resources of this country.

The scenery upon the Atrato is but an unending panorama,



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ISTHMIAN WILDERNESS.

exhibiting the thousand and one curious and fantastic forms into which nature loves to weave her tropical mantle. Above the dense, rank undergrowth forcing itself to the very waters' edge, rise the tall trees, doubtless centuries old. Here stands one of gigantic dimensions, its trunk and branches blazing with brilliant orchids, and completely hidden by the leaves and flowers of innumerable vines that cling to it for support and nourishment. And there another, almost without a leaf, holding aloft its giant arms which afford a resting-place for hundreds of screaming parrots, or a family of chattering monkeys, who grin at the traveller as he passes, and cut strange capers apparently for his special amusement.

Upon the muddy banks and sandy *playas* enormous alligators sleep in the sun, waking only to slide lazily into the water at the shout of the boatman or the crack of a rifle.

Now and then may be seen a strange-looking craft, crowded with naked negroes, who propel their vessel lazily against the current, walking fore and aft the deck with their long *polancas*, and keeping step to a wild, monotonous chant, strangely appropriate to the wild surroundings of the scene. These are *Bungoes* or *Barquetonias*, trading between Cartagena and Quibdó, laden on the upward voyage with cottons, *añisado*, salt, knives, guns, pistols, Yankee notions, and trinkets of all sorts; and, on the return, taking gold, rubber, ivory-nuts, orquilla, and the various dye-woods of the country.

As may be supposed, the proximity of this stream, in certain portions of its course, to the western shore of the continent did not fail to attract early attention, and repeated attempts have been made to discover some place where the low range of the Cordilleras of the coast might be cut by a canal, and communication thus carried forward from ocean to ocean.

Prominent among those who have been interested in this enterprise we find again Mr. Kelley. His attention was first turned to a route by way of the Atrato and San Juan rivers — the site of the mythical "Raspadura Canal"* — but finding that impracticable, he directed his efforts to the discovery of a line for a direct cut from

* I say "mythical", because the existence of anything worthy of the name of canal seems, by Trautwine's survey, to have been disproved. It is, however, mentioned by Humboldt, who says: "The small canal of Raspadura, which a monk, the curate of Novita, caused to be dug by the Indians of his parish, in a ravine periodically filled by natural inundations, facilitates the inland navigation for a length of seventy-five leagues, between the mouth of the Rio San Juan

the Atrato to the Pacific.* In this his engineers were so far successful as to find a route from Humboldt's Bay, by way of the Nerqua and Truando rivers to the Atrato, which appeared so favorable as to induce the United States government to take the matter in hand. Accordingly an expedition was fitted out, under the joint command of Lieut. (now Brig.-Gen.) Michler, of the United States Engineers, and Lieut. (late Commander) T. A. M. Craven, of the United States Navy, for the more complete examination of this route.

These gentlemen completed their prescribed task with the result of "confirming, in all essential particulars," the work of their predecessors, and by Gen. Michler a canal line was projected from Humboldt's Bay to the Atrato. The entire length of this line was forty-five miles: it involved the construction of two tunnels, one 820 feet, and the other 12,250 feet in length, and its cost was estimated at \$134,000,000.†

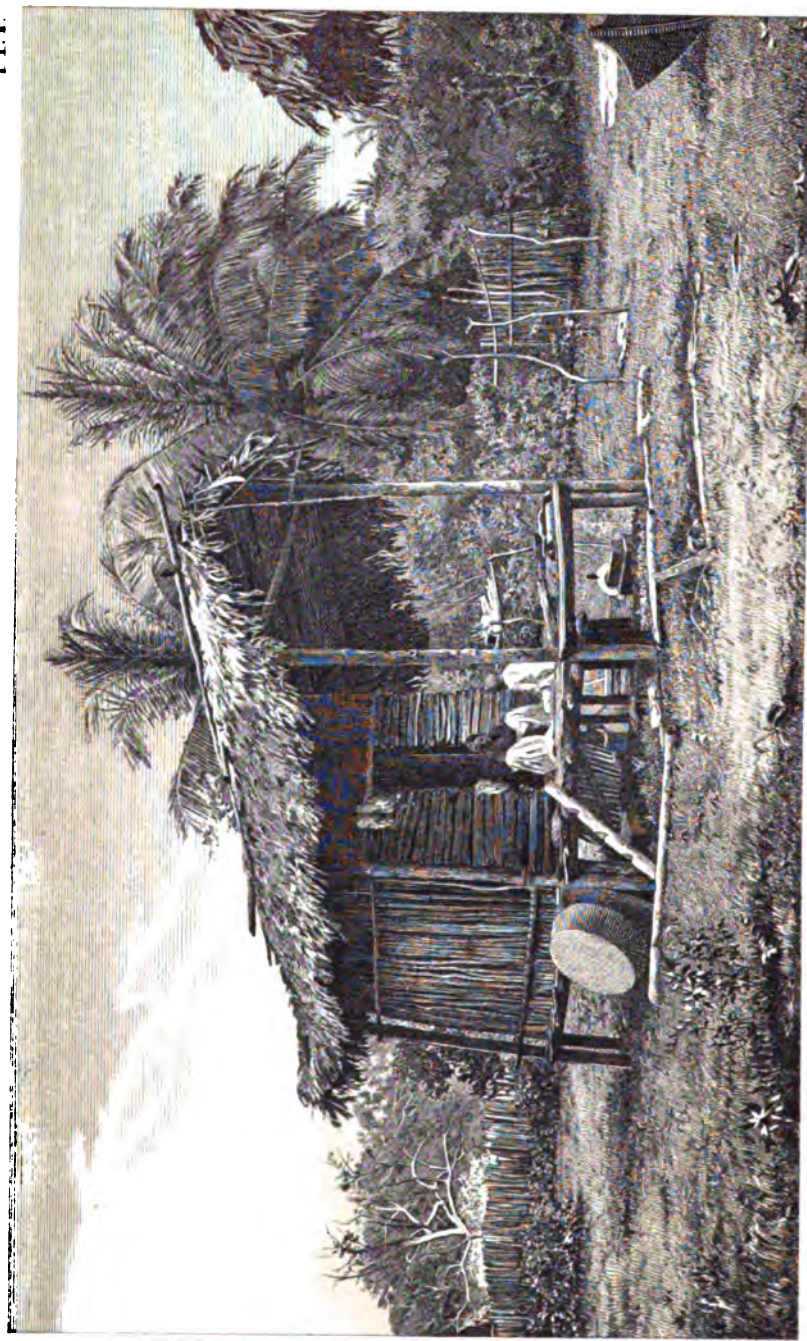
But, notwithstanding these favorable results, no further action was taken, and in this state the matter rested until the winter of 1871, when Capt. Selfridge, then engaged on the Atrato-Tuyra route, had his attention called to the advantages of Cupica Bay and the so-called Napipi route. He accordingly detailed a party, which commencing at Limon Bay, an arm of Cupica, crossed the divide and followed the Napipi River to the Atrato. They crossed the Cordilleras at an altitude of 613 feet, found the country beyond to be exceedingly favorable, and reported a line of thirty-two miles in length, five miles of which would require tunnelling.

The lateness of the season prevented any extensive examination of the surrounding country at that time, nor did another opportunity occur until the winter of 1873, when a party was sent out for that express purpose. The results of their explorations induced the captain to shift his initial point from Cupica Bay to that of Chiri-Chiri, some ten miles further south. From this point, by crossing the divide and following in a north-easterly direction the valley of the

below Noanama, and that of the Atrato," etc. Humboldt's "Personal Narrative," vol. VI, part I, p. 260. If such a canal ever existed, it could have been nothing more than a rude ditch capable of affording passage for the native canoes, which require but a few inches of water.

* Kelley "On the Junction of the Atlantic and Pacific Oceans and the Practicability of a Ship-Canal without Locks by the Valley of the Atrato."

† Report of the Secretary of War, communicating Lieut. Michler's report, 1861. Capt. Selfridge, in his report, calls attention to the fact that, applying to this line the same cost per cubic yard as he allows for the Napipi-Duguado-Atrato route its cost would exceed \$150,000,000.



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HOUSE OF CHOCO INDIANS.

Dogüado to its junction with the Napipi, and thence that river to the Atrato, the line was shortened to twenty-eight miles and the distance requiring tunnelling to about three miles.

Some further details concerning this route and the work it is there proposed to construct will be given further on: I now invite your attention for a moment to the present condition of the country likely to become, before many years, conspicuous as the grand highway of international maritime communication.

The "sovereign State of Cauca", within the jurisdiction of which this route is situated, is one of the integral parts of our sister republic, the United States of Colombia. The area of this state is about 68,300 square miles; it contains a mixed population of, perhaps, 300,000, and it is divided into four cantons,—Buenaventura, Pasto, Popayan, and Choco. With the last of these, as the district within which lies the site of the proposed canal, we are particularly interested.

The mountainous portions of this province are inhabited by the scattered remnants of the Indians who were the aborigines of the country. The personal appearance of these Indians is similar to that of those who inhabit the isthmus further north, while in disposition these are even more mild and inoffensive than those. They are a frank, honest, and hospitable people, at whose hands the stranger may be sure of nothing but kindness. When engaged as laborers they are faithful, uncomplaining and industrious. Unaccustomed to systematic labor, however, we found that they soon tired of the monotonous drudgery attendant upon surveying, and they were also apt to suffer severely from home-sickness if kept long from their friends. They subsist chiefly by hunting and fishing—game being more plenty here than on the isthmus—and are tillers of the soil secondarily and to a very limited extent only. As they have neither towns nor villages, each family lives by itself, generally far removed from any other, but they maintain, by means of their canoes, constant communication with each other, all appearing to be on terms of cordial intimacy.

Nothing can exceed in simplicity the every-day costume of these people, for both male and female. The women wear only a strip of coarse cloth wound about the waist and falling to the knee. The men improve upon this even, and wear absolutely nothing but a microscopic breech-cloth. The youth of both sexes "roam fancy free" without artificial covering of any sort. Both sexes paint or stain the body, though the practice appears to be more common

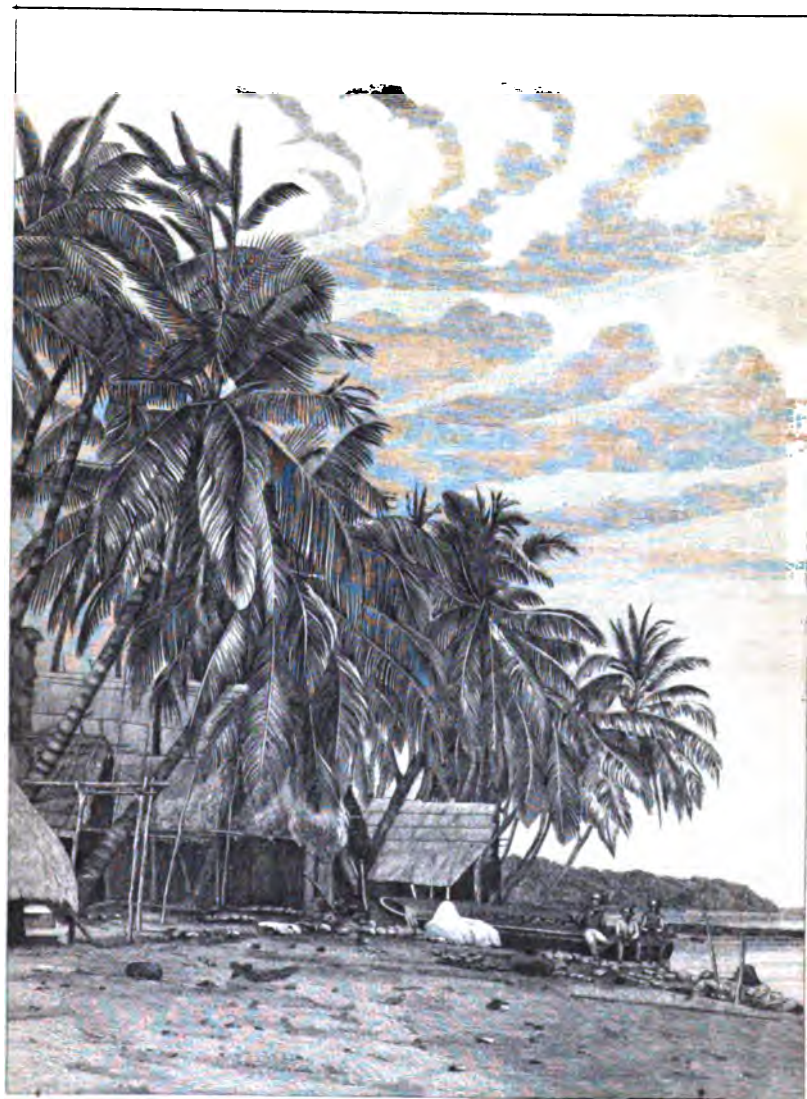
among the males than among the females. The body of a man in full dress is completely covered with the jet black *caruto*,* frequently laid on in some fantastic open-work pattern. The bright red *anoto** is more sparingly used to stripe and dot the face and forehead, and, by way of contrast, the hands and feet are sky-blue. In addition to this elaborate costume, the neck and loins of the man — if he be well-to-do — are encircled with numberless strings of beads; from bands of beads about his head depend bunches of fragrant roots and barks; he wears broad bracelets of virgin silver, and carries button-hole bouquets in immense holes in the lobes of his ears.

Their habitations are of the rudest possible construction, far inferior to those of the isthmus Indians, consisting only of a heavily thatched roof supported upon posts driven into the earth, with a rough flooring laid across five or six feet above the ground. The sides of this house — if so it may be called — are usually left entirely open. A fire in one corner, on a pile of stones, serves for their simple cooking operations, while a few gourd calabashes, an iron pot or two, and a hollow stone to serve as a mortar, comprise the list of culinary utensils.

The following happy description of the Indians of the *tierras calientes* of Central America, given by the Chevalier Morelet, is strikingly applicable to those of this region.

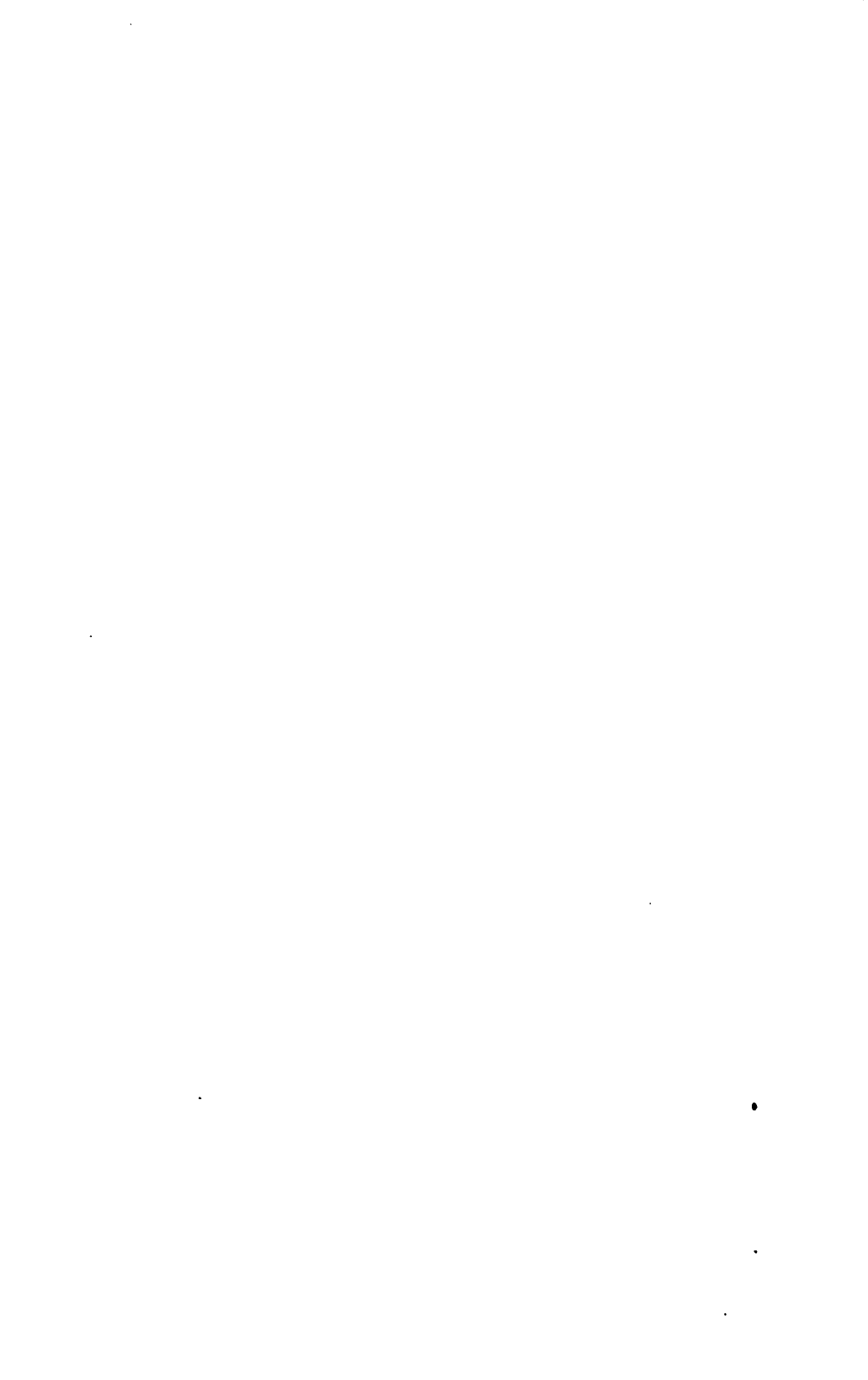
“The physical education of the Indian commences early. When ten or twelve years of age, a *machete* is put into his hands, and a load proportioned to his years upon his shoulders, and he is made to accompany his father in his excursions or his labors. He is taught to find his way in the most obscure forests, through means of the faintest indications. His ear is practised in quickly detecting the approach of wild animals, and his eye in discovering the venomous reptiles that may lie in his path. He is taught to distinguish the vines, the juices of which have the power of stupefying fishes so that they may be caught by the hand, as also those which are useful for their flexibility, or for furnishing water to the wayfarer. He soon comes to recognize the *leche maria*, the precious balm with which he can heal his wounds, and the *Guaco* which neutralizes the venom of serpents. He finds out the shady dells where the *cocoa* flourishes, and the sunny eminences where the bees go to deposit their honey in the hollow trunks of decaying trees. He learns, or is taught, all this early, and then his education is complete. When he reaches the age of sixteen or seventeen years, he clears a little

* *Caruto* is the black, caustic pigment of the *Genipa Americana*. *Anoto*, *onoto*, or *arnotto* is a brilliant coloring matter extracted from the pulp of the *Bixa orellana*.

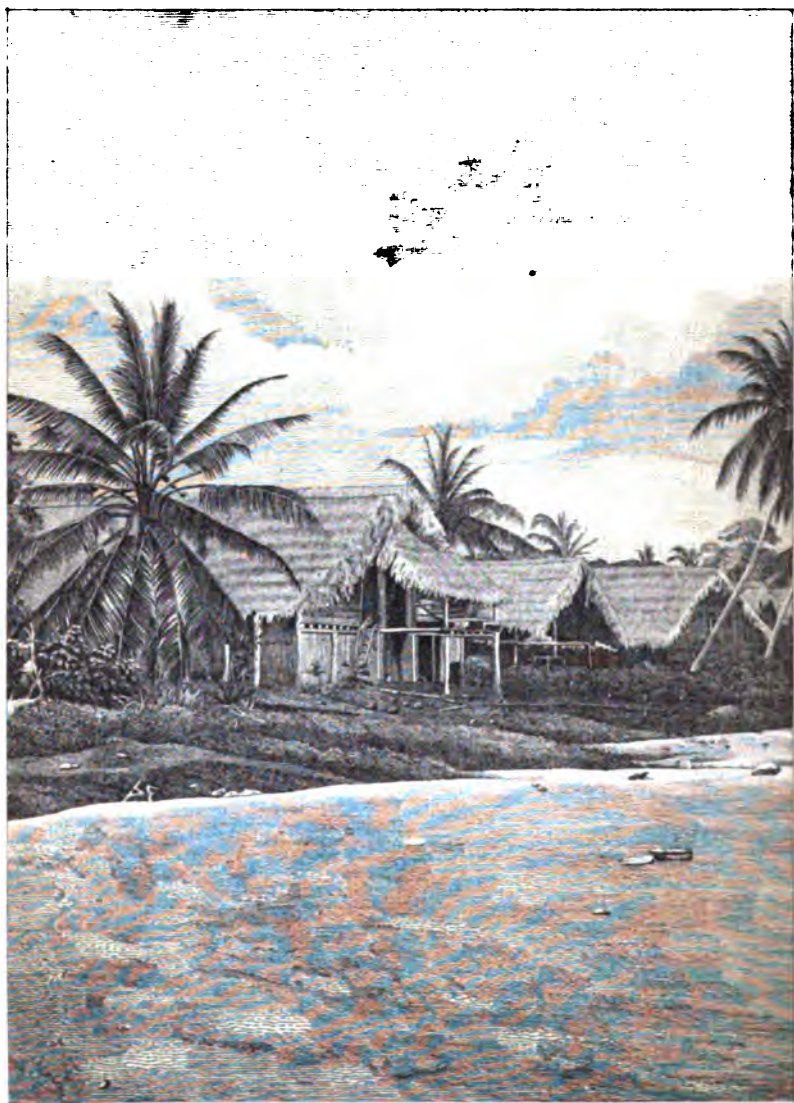


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VILLAGE OF SAN BLAS INDIANS.







Lith. Wood. Parsons & Co. Albany, N. Y.

VILLAGE OF SASSARDI INDIANS.

spot of ground in the forest, with the aid of fire and his *machete*. He plants it with maize, builds a little hut in one corner, and then brings to it a companion, most likely one who was affianced to him in his earliest infancy. Without doubt, he has some regard to the age and attractions of his female companion; but his marriage, if the union may be so called, is based on none of those tender sentiments and mutual appreciations which, with us, lie at the foundation of the social superstructure. * * * Here each man cuts the timber for his own house, carries it on his back to the spot where he wants it, puts it together with withes, and thatches it with straw with his own hands. He cultivates just enough ground to furnish his individual supplies, or gathers them from among the natural productions of the forest. His scanty furniture is equally the work of his own hands, as is also the still scantier clothing which he wears. When sick, he makes use of the few vegetable simples, of which his father taught him the virtues, and which he collects in the wilderness. Time with him has no value, and without hope or care for the future, his ideal happiness is in present repose. His absolute material wants are his only incentives to action. His vague ideas of fatalism furnish him equally with an excuse for his indolence and a basis of contentment under all the circumstances of his condition. He supports stoically the maladies which may afflict him, and the evil fortunes which may befall him. Death almost always finds him prepared. 'My hour is come!' or, 'I go to my rest, my work is done!' are the only observations which he makes on its approach."*

The vine mentioned above as useful for furnishing water is worthy of more extended notice. It is called by the natives the *vejeco blanco*, and is found hanging in immense festoons from the tall trees. So abundantly does this remarkable parasite yield cool, clear, and delicious water, that I have frequently half filled a canteen from a piece two or three inches in diameter and not above a foot in length.

The bulk of the population of this province of Choco, is composed of negroes, descendants of slaves imported from Africa when the country was under the rule of Spain. Many of these have preserved the purity of their blood with singular strictness, and are as black as the princes of Congo. From this extreme they ascend by gradations—as gradual, if not as beautiful, as the insensible blending of the tints of the solar spectrum—to the pale yellow of the octoroon. They live principally along the banks of the Atrato, or near the mouths of its tributaries, where they cultivate, in their lazy way, bananas, plantains, sugar-cane, bread-fruit, and Indian corn. These the rich soil produces almost spontaneously; yet the

*"Travels in Central America." From the French of the Chevalier Morelet; By Mrs. M. F. Squier.

negroes are so indolent as to raise barely enough to keep themselves from starvation, and would frequently suffer for food were it not for the fish that abound in the Atrato.

Their condition is, indeed, but little superior to that of the Indians. But they are of a more social disposition, and congregate in little villages — sometimes picturesque, but never clean — where their mode of life exhibits a most incongruous jumble of Spanish, African, and Indian customs. Their houses are essentially similar to those just described, but with the sides inclosed with cane. As the Atrato is inclined, during the wet season, to manifest a disposition to overflow its banks, these structures usually stand raised some four or five feet upon posts; an arrangement which gives them an air of instability that is frequently enhanced by a sad want of perpendicularity. This latter feature is, also, I am pained to observe, frequently to be noticed, particularly on *fête* days and other occasions of public rejoicing, in the bearing of the greater portion of the inhabitants.

As a race, the men are tall, well-built, and muscular. The women, also, are well-formed, and, when young, comely after their fashion. But they develop early, marry young (usually without the benefit of either priest or magistrate), and, as a consequence, at thirty-five or forty become wrinkled, toothless hags among whom Macbeth's witches might have reigned as belles of peerless beauty.

Being nominally converts to Catholicism, these people designate themselves as *Christianos*, in contradistinction to the Indians, whom they regard as pagans. I once endeavored to draw from one of these *Christianos* his idea of the moral difference which constituted the basis of this distinction, but could obtain no more satisfactory answer than that the Indians were not Christians because they paid no taxes! Do not our learned theologians sometimes draw the fine shades of separation upon a less tangible basis than this?

The inhabitants of the lower portion of the valley of the Atrato find their principal employment in collecting the rubber, which is so abundant in that region that, with proper management, the supply would be almost inexhaustible. The trees are thickly scattered over an immense area, and each will yield, it is said, from two to three tablespoonfuls a day for twenty years. But the negroes, in their short-sighted cupidity, cut the trees down as they find them, thus obtaining a large quantity with little trouble, but "killing the goose which lays the golden eggs".

The rubber-tree is stately and of remarkable beauty. Upon



NEGRO VILLAGE.

cutting through its bark the milk-white juice, of a creamy consistency, flows freely. This is collected by the natives, deposited in shallow pits dug in the ground, and allowed to harden, turning to a blackish brown in the process. Then, in the shape of irregular slabs, it is sent to Panama or Cartagena, where it is purchased by the agents of the various manufacturing companies. By them it is subjected to heavy pressure to rid it of water and foreign matter, and then re-shipped to appear finally in the multitudinous articles of use or ornament with which every one is so familiar.

In the upper portion of this valley the inhabitants derive their chief revenue from *gold-hunting*,—it cannot be called *mining*,—and this is destined at no distant day to become a most important and profitable industry. All the streams—and their name is legion—that come into the Atrato from the eastward, having their sources high up among the Antioquian Mountains, bring down this precious metal suspended in their waters. Their gravelly beds and sandy *playas* are rich with gold, which is so abundant as to be carried, during the floods of the rainy season, into the Atrato itself.

The means employed by the natives to obtain the ore are, as may be supposed, rude in the extreme. Vein mining is carried on to a very limited extent only, and then with machinery of the simplest possible construction. The greater portion is obtained by washing the sands of the streams just after the subsidence of the floods of the rainy months. Most of the metal thus secured finds its way to Quibdó, the capital and principal town of the province, where from \$200,000 to \$300,000 worth is frequently collected in the course of a single year.* Such an amount as this, considering the means employed, and the desultory way in which the search is carried on by the lazy natives, certainly indicates a richness in those gold regions that promises most profitable returns when the influx of labor and capital shall enable the business to be conducted in a systematic and scientific manner.

From the eastern slope of the Antioquian Mountains, reached by

* This information I received while in Quibdó in April, 1878, from Señor Farara, the *Jefe Municipal* of the canton of Choco, a native of Quibdó, who was educated in the United States, and is an exceedingly intelligent gentleman. While there I saw several pounds of the ore as brought in by the natives. It is apparently of very fine quality, and is mostly in the shape of small flat scales with an occasional nugget of the weight of a dollar or more. When brought in, it is mixed with quite a percentage of ferruginous sand; that is, of course, carefully extracted with a magnet, by the purchaser, before weighing.

way of the Magdalena and Cauca rivers, the exportation of gold now amounts to several millions of dollars annually. On their western slope, accessible by the Atrato and its tributaries, there is, it is estimated, an area of 2,000 square miles over which gold may be collected almost indiscriminately as regards locality.* What a rich field for American energy and capital!

It should be remarked, however, that the difficulties in the way of transporting the requisite supplies and machinery with the present facilities, or want of facilities, would be almost insuperable. But, when the country shall have been opened up, and depots of supplies and proper means of transportation provided, it can hardly be supposed that so tempting a field will long be allowed to remain unworked and unprofitable.

The climate of this country now demands a passing notice. Two distinctly marked dry seasons are here presented with their corresponding periods of rain,—a consequence of being so situated in latitude as to be twice overshadowed by the “equatorial cloud-ring”, under which precipitation is almost constant, as it follows the sun in his grand annual swing from Cancer to Capricorn and back. January, February, and March are the months which constitute the pleasantest and driest season. In April the rainy season begins to set in, and in May and June the rains are almost incessant. In July they begin to lessen again, and August and September are comparatively dry; but in October the rains again commence, and in November and December they are at their heaviest.

Throughout this country malarial fevers prevail more or less, especially during the commencement of the dry seasons, when the low rivers and drying swamps present vast areas of half-decayed vegetable matter to the action of the powerful sun; but these fevers are of a mild type, and easily controlled by quinine. The fact that not a man was lost from climatic causes during all the three expeditions of Commander Selfridge, notwithstanding the hardships and exposure to which they were subjected, proves conclusively, it appears to me, that, upon the whole, the climate is much less insalubrious than is generally supposed.

In geological character there is a marked difference between the isthmus proper and the regions farther south. In the former locality the low land rests entirely upon a coralline substratum, while

* Trautwine.

the mountains belong to the hypogene formation, consisting mainly of granite and syenite.

In the valley of the Tuyra, however, and to the southward, the formation may be placed under the general head of trap, being entirely volcanic, and of recent date in the geological sense of the term, though ancient enough as compared with man. All the characteristics of this region seem to indicate that it must have been submerged while yet the land forming the Isthmus of Darien had long been upheaved and had assumed nearly its present form. At that period, then, "the Atlantic and Pacific oceans intermingled their waters and washed the base of the Cordilleras of Darien",

It was only when nature was preparing to bring man upon the scene that she closed the gate: even then leaving it almost ajar, as if to tempt him to vindicate his manhood and re-open it. The isthmus does not appear to be very rich in metals, although "numerous veins of pure copper were met with on the Sassardi, and indications of iron were observed in all the mountains."

There are thermal springs on both the Napipi and Doguado rivers, the water being of a temperature of 110° F., and emitting a faint odor of sulphuretted hydrogen. These springs are held in high estimation as baths, by the natives, many of whom resort thither for the cure of various diseases.

My paper, in spite of my promise to be brief, has already grown to such a length that I fear I am taxing your patience severely, yet I cannot close without attempting to give you some idea of the facilities which the Napipi-Doguado route affords for the construction of a canal.

It is, of course, impossible to determine at present what plan of construction will be adopted after the requisite, careful and extended surveys for locating the line with precision, shall have been made. We may, however, gain a good idea of the general character of the proposed work, by considering for a moment that plan which, in the present state of our knowledge, appears most feasible.

The junction of the Napipi and Doguado rivers upon this route, affords an ample water supply for locking up at least ninety feet above the surface of the Atrato, which is itself, at the point where the canal will enter it, forty feet above the plane of mean tide — our datum line. In a canal where locks are to be used, this question of an unfailing water supply is, of course, of vital importance; it therefore received careful attention. Frequent measurements of the Napipi at its junction with the Doguado, proved that it would

give a liberal supply for twenty-four lockages per day,* while, to put the question beyond dispute, this supply may be doubled by a feeder three miles long, from the Cuia. In this connection it is of interest to note that the valley of the Cuia, at the point where it would be tapped by the feeder, is some fifty feet higher than the proposed summit level. This would give ample head to insure the delivery of as much water as might be required.† The figures below represent the minimum supply at the close of the dry season.

Should it, therefore, be deemed desirable to reduce the first cost of the canal by resorting to locks, eight, with a lift of ten feet each, let us suppose, might be employed on the Atrato side. The entire length requiring excavation by this line is 148,840 feet, or 28½ miles nearly. Of this distance, 107,900 feet, or 20.3 miles, following the valley of the Napipi, are through an almost level plain, having a slight and gradual rise. Distributing in this section eight locks, so as to keep the cutting near the surface, the average depth of the required cut would be only forty-five feet, and the amount of excavation 5,436,300 cubic yards of earth and 8,163,000 cubic yards of rock.

Leaving the valley of the Napipi at its junction with the

SUPPLY.

* Flow of Napipi close of dry season (per hour)	520,000 cub. ft
	24
Supply for twenty-four hours.....	<u>12,480,000</u> "

DEMAND.

Leakage, at 3,000 cubic feet per minute.....	4,820,000 cub. ft.
Evaporation.....	288,000 "
Waste.....	1,000,000 "
Twenty lockages per day, equal to 20,000 tons.....	<u>4,611,800</u>
Total required.....	10,219,800
Supply	<u>12,480,000</u>
Excess.....	<u>2,260,400</u>
† Forty lockages per day	9,223,200 cub. ft.
Leakage, etc.....	<u>5,608,000</u> "
	14,831,200 "
Napipi and Cuia rivers combined.....	<u>23,280,000</u> "
Excess.....	<u>8,448,800</u> "

Dognado, and following that river, the rise becomes somewhat more rapid, so that for a distance of 16,400 feet, or 3.1 miles, the average cut would be seventy-three feet, and the excavation 442,200 cubic yards earth, and 2,465,400 cubic yards rock. There the steep acclivity of the ridge may be said to commence. The open cut, however, might be continued, a distance of 5,240 feet, for which the cutting would average 198 feet. For this mile the excavation would be 141,300 cubic yards earth; 2,111,200 cubic yards rock.

At this point it is presumed a tunnel would become cheaper than an open cut and would, therefore, be resorted to. It would extend 15,700 feet, or about three miles, and would require the excavation of 3,314,388 cubic yards of rock. The short section beyond the western portal of the tunnel, 3,600 feet in length, would be occupied by twelve locks, by which the descent to or the ascent from the Pacific would be made. Its contents are estimated at 67,880 cubic yards earth, and 395,990 of rock. From these we have a grand total excavation of 6,087,700 cubic yards earth; 16,449,900 cubic yards rock.* These figures are based upon a canal of the following dimensions: — Width at bottom, sixty feet, at water surface, seventy feet; width of tunnel at bottom, forty feet, at water surface, sixty feet; height from bottom to crown of arch, 112 feet; depth of water throughout canal, twenty-five feet. As these dimensions will not allow vessels of large size to pass each other in the canal itself, two or more turn-outs, or sidings, would be required at different points.

From the foregoing data, estimating the cost of removing earth at thirty-three cents per cubic yard; rock at \$1.25 to \$1.75, according to position; and tunnel work at \$5.35 per cubic yard, Capt. Selfridge obtains the following as the cost of the proposed canal:

Cost of excavation	\$41,828,497
Cost of reservoir.....	550,000
Cost of aqueduct from Ouisa to Napipi.....	606,000
Cost of culverts	500,000
Cost of railroad, narrow gauge.....	1,000,000
Crossing the Napipi River	1,000,000
Grubbing and clearing	500,000
Sea-wall, Chiri-Chiri Bay	200,000
Wall, Atrato River	25,000
Executive department.....	120,000
Engineer department.....	375,000

* It is, of course, understood that these figures are approximate only, being derived from our preliminary survey, which was necessarily hasty and limited.

Pay department.....	\$90,000
Quartermaster's department.....	135,000
Commissary department.....	120,000
Medical department....	80,000
Hoisting and pumping engines.....	875,000
Improvements, mouth of Atrato.....	462,000
Twenty-five per cent. for contingencies.....	12,116,749
Grand total.....	<u>\$60,583,746</u>

You will observe that, in order to place the estimate at its outside limit, the calculated cost has been increased by twenty-five per cent of itself for unforeseen contingencies. This certainly should be considered as a liberal allowance; but if it were to be increased by fifty per cent. or even seventy-five, the grand total would still be a most moderate sum, considering the nature of the proposed work. The above is but one of four plans, all of which are considered feasible. The other plans are briefly described by Capt. Selfridge as follows:

"Plan B.— This differs from the preceding so far that the bottom of the canal is carried only fifteen feet below the grade line, and embankments are formed on each side some fifteen feet high to retain the waters of the canal; but this will only apply to division No. 1, the others will necessarily remain an ordinary cut. In other respects it does not differ from Plan A, except by requiring one more lock. The advantage of this plan is the minimum cost of division No. 1. * *

The total cost by this plan is \$53,937,247.

"Plan C.— This plan proposes but four locks to the summit level and eight down. Its advantage is in tapping the Napipi River lower down, and in causing less delay in passing through but half the number of locks. The excavation will necessarily be much greater, and the tunnel will be 1,900 feet longer than in Plan A. * * * The total cost of canal by this plan will be \$72,518,795.

"Plan D.— This differs from all the others by proposing to do away altogether with locks, except the three at the western terminus to equalize the difference of level between the Atrato at the point where the canal leaves it, and the Pacific Ocean. It will be, therefore, a straight cut and filled from the Atrato. * * * Necessarily the excavation will be much greater, and the tunnel will be increased 3,900 feet, making its whole length 3.71 miles. The cost of excavation by this plan will amount to \$81,815,320, and the total cost of canal as an open cut will amount to \$90,113,445."

Here it seems proper to compare concisely the advantages presented by this route with those offered by its rivals. These may now be considered as practically reduced to two, Tehuantepec and Nicaragua; and these are rivals, not from any superior advantages

for the construction of the canal itself, but solely on account of geographical position. In this respect, especially if we regard the enterprise from a purely American point of view, it is evident that Tehuantepec takes the lead, while the other routes follow in order as we go south. But neither Panama nor Truando are sufficiently ahead in this respect to counterbalance their obvious disadvantages in other ways, so, as I said, we need consider only Tehuantepec, Nicaragua and the Napipi-Doguada, for at one of these three points the canal will surely be built, if built at all.

Tehuantepec and Nicaragua have both been recently and ably surveyed by officers of our navy — the former under the direction of Capt. R. W. Shufeldt, and the latter under that of Commander E. P. Lull. The report of Capt. Shufeldt, while it demonstrates the *possibility* of constructing a canal across the Isthmus of Tehuantepec, shows with equal clearness that the project is not practicable in the sense in which that term has been used in this paper. That is to say, it would require such a vast outlay of time and money for its construction as to preclude any idea of its ever proving a paying investment for capitalists.

Capt. Shufeldt himself says it would require *national* resources to build it. Its length would be 144 miles; it would require 140 locks; and a feeder twenty-seven miles long, passing through a country "subject at all times to serious terrestrial convulsions", with an aggregate of three miles of tunnelling, would be necessary in order to supply it with water. It would require a large outlay to provide proper harbors either at the mouth of the Coatzacoalcos River on the Atlantic side, or at the Bay of Salina Cruz, the proposed Pacific terminus. In addition to all these formidable physical obstacles, the present population of the country is hostile to the enterprise.

The report of Commander Lull has not yet been made public, so we have no proper basis for comparison of the Nicaragua line. We know, however, from previous surveys,* that the length of actual cutting for a canal by this line would be something over 100 miles; that the region is peculiarly subject to the action of volcanic agencies, and that the line is destitute of good harbors at either end.†

* Survey of Messrs. Childs and Fay in 1850-51, as given in Admiral Davis's report in 1866.

† Since the above was written, I have learned from the report of Commander Lull, published in the Report of the Secretary of the Navy, that he found this

How, now, is it with the Napipi-Dognado? In the matter of length it is, of course, greatly ahead. As for harbors, it has on the Atlantic side the Gulf of Darien, which unites accessibility, security, capacity, — all the qualities, in short, that could be desired; while on the Pacific side it opens upon a region where ships may safely lie at anchor in an open roadstead year in and year out. Moreover, there is on that side, within ten miles, the Bay of Cupica, where ships might conveniently lie, if desirable, while awaiting their turns for passage through the canal.

Then there is the earthquake question which has already been alluded to as a great objection to both Tehuantepec and Nicaragua. The vicinity of the Napipi, according to Dr. Maack, the geologist of the expedition, is of the very oldest, tertiary, volcanic rock that gives evidence of having lain undisturbed for ages. This fact, and the results of long experience, go to show that this region is little likely to be affected by volcanic disturbances of such a character as to endanger the permanency of the canal works. Too much stress cannot be laid upon this fact when considering the comparative advantages of the rival routes.

The only point, then, in which the Napipi route appears at any decided disadvantage, is that it requires a tunnel, and this, in the public mind, seems to be a terrible *bête noire*. I will not tax your patience to listen to any argument to prove that such a tunnel is perfectly practicable, but will content myself with stating that it is so considered by the most eminent engineers of our country.

It, of course, introduces an element of uncertainty into the estimates of cost, since it is impossible to predict with certainty what may be encountered in the interior of the hills it is proposed to pierce. In the estimates already given, the allowance of twenty-five per cent. ought to be sufficient to cover all unlooked-for contingencies. Should, however, the rock prove of such a character as to require extensive arching of masonry, the expense would be largely increased.

But, regarded as a mere question of engineering, such a tunnel as this line would require would be but a small matter in comparison

line much more favorable than had been previously supposed. According to his surveys the total length of canal will be only 61.7 miles, of which 47.3 will be in excavation and embankment, leaving but 14.4 miles in which the excavation will be greater than the prism of the canal. Ten locks will be required, and it is thought that the harbors of Greytown and Brito can be readily improved. Under these circumstances Nicaragua becomes a formidable rival to the Napipi.

with some already constructed; for it is the *length* of a tunnel, and not its *size*, it should be remembered, that renders it formidable. The greater the size the easier the excavation, — other things being equal.

The necessity for a canal across some one of the American isthmuses is so apparent and so generally admitted, that any argument upon that head at the present time would be superfluous. I will, however, show you the following tables, prepared for Capt. Selfridge's report. The figures are more eloquent than words:

TABLE showing the probable saving in time and distance to be effected for sailing ships by an Interoceanic Canal.

OUTWARD BOUND.	BY PRESENT ROUTE.		BY CANAL.		GAIN.	
	Miles.	Days.	Miles.	Days.	Miles.	Days.
New York to:—						
Hong Kong.....	14,980	110	12,480	88	2,450	27
Shanghai	15,200	115	12,200	81	3,000	34
Yokohama	15,750	119	11,550	79	4,200	40
Manila	13,700	106	12,260	80	1,440	26
Batavia	13,170	105	13,425	87	18
Sydney	13,220	105	10,480	75	2,740	30
Valparaiso.....	9,760	90	6,510	52	3,250	38
Callao.....	11,100	105	6,710	58	4,390	52
Honolulu.....	14,500	121	7,400	54	7,100	67
San Francisco.....	14,840	180	7,470	58	7,370	72
HOMEWARD BOUND.						
To New York from:—						
Hong Kong.....	14,660	110	11,875	87	2,785	28
Shanghai	16,000	118	11,805	80	4,695	38
Yokohama	16,070	114	10,870	77	5,700	37
Manila	14,010	109	12,035	88	1,975	21
Sydney	13,410	110	10,390	70	3,020	40
Valparaiso.....	9,780	90	4,965	42	4,815	48
Callao.....	11,120	100	3,690	33	7,430	68
Honolulu	15,760	110	8,055	63	7,705	47
San Francisco.....	14,970	125	5,980	50	8,990	75

NOTE.—All distances are in nautical miles. The days under "present route" are actual averages obtained from various reliable sources. The days "by canal" are computed; the data given in Maury's "Pilot" and "Wind and Current Charts" being the basis of the computation.

TABLE showing times and distances for steamers between New York and various points, via Interoceanic Canal.

OUTWARD BOUND.	Miles.	Days.	Remarks.
From New York to:—			
Sydney	9,970	40	
Hong Kong.....	12,165	48	Via Honolulu.
Manila.....	12,005	47	do
Shanghai.....	11,605	46	do
Yokohama.....	10,675	48	do
Batavia.....	13,000	51	
Honolulu.....	7,155	29	
Callao.....	8,500	15	
Valparaiso.....	5,000	21	} Same on return passage.
San Francisco.....	25	
• HOMEWARD BOUND.			
To New York from:—			
Sydney	9,970	42	
Hong Kong.....	11,735	46	Great circle route.
Manila.....	12,825	48	do
Yokohama.....	10,815	48	do
Honolulu.....	7,300	29	
Batavia	13,120	54	

The question of the probable revenue from the canal is of sufficient importance to demand passing notice. From careful calculations, founded upon the statistics of trade for 1870, it is estimated that the canal will yield, at the end of the second year, a net income of over \$5,000,000, or nearly nine per cent, upon its cost of \$60,000,000, and there can be but little doubt that this sum will be doubled in a few years by the increase of trade stimulated by the canal itself. It would undoubtedly, then, prove a profitable investment.

And now, gentlemen, I have hastily and imperfectly sketched the results obtained by three successive seasons of persevering labor and no little hardship. In endeavoring to sift the immense mass of material at hand, I have been obliged to pass over many important points, while I have, perhaps, dwelt longer upon others than their interest would justify. But I have attempted to show you what geographical questions have been answered; to give you an idea of the little known regions visited; and to put you in possession of the leading facts relative to the newly discovered route and the work which it is there proposed to construct, in order that you may be able to judge for yourselves of its merits as compared with those of other lines that may be proposed.

As to which of these affords the greatest facilities for the practical solution of this grand problem, there may be room for doubt; as to the imperative necessity for a canal by one or the other of them, there can be no question.

V.

PALESTINE EXPLORATION.*

BY CHIEF-JUSTICE CHARLES P. DALY.

DELIVERED DECEMBER 5TH, 1878.

A meeting of the Palestine Exploration Society, Prof. Roswell D. Hitchcock, President, was held at Association Hall on the evening of December 5th, under the auspices of the American Geographical Society. Chief-Justice DALY, on taking the chair, said :

We assemble to-night, ladies and gentlemen, to hear an account of the recent explorations in Syria, organized by the Palestine Exploration Society of this city, and to express our opinions on the importance of continuing the work. To that large number of the human family who believe in the Christian faith, and to that widely dispersed race whose history and whose teachings are embodied in the Old Testament, there is no place on the earth's surface so interesting as Palestine. To the Jew it is the land of his fathers ; to the Christian it is the birthplace of his religion ; while to the archæological student and the historical critic it is, to use a Darwinian phrase, the connecting link between those ancient civilizations which flourished upon the banks of the Nile and the banks of the Euphrates and the Tigris. It is of interest, also, to the geographer ; for there is no place within equally narrow limits the geography of which is more complicated, or in which the physical features of the country have exercised a more marked influence in producing the characteristics and shaping the history of the people. Indeed, so embarrass-

* The American Holy Land Exploration Society (Robert Morris, LL. D., Secretary) has engaged A. L. Rawson, the artist and traveller, to make a series of five visits to Palestine. It is designed to gather geological specimens to complete the collection now in the Central Park Museum, representing Egypt, Sinai, and a part of Syria. A set of skins of animals, birds, and reptiles will also be gathered. Scenery, topography, and archæology will receive due attention.

ing is the inquiry, that there is no problem in ethnology so difficult as that of the early races that peopled Syria, culminating as they did in the formation, upon the shores of the Mediterranean, of the greatest maritime nation of antiquity, Phœnicia, and, in the inland plains and highlands, of the Semitic nationality, the people of the House of David, that stood midway for so many centuries as the wave of conquest rolled forward and backward from the Nile to the Euphrates, from the Assyrian to the Egyptian. Whatever knowledge we possess of this interesting country has been derived hitherto chiefly from travellers, and all the mere traveller can furnish is already familiarly known ; it is of those parts which the traveller can visit in safety. But of the region east of the Dead Sea and north-east of the river Jordan, of the great plateau stretching as far as the Euphrates, we know comparatively nothing. The home of a wild, nomadic, and dangerous race, it has been for centuries locked up from the knowledge of mankind ; and how little we have known of it until recently may be inferred when I state that upon the great atlas of Keith Johnson, published only seven years ago, the Land of Moab and of Edom is a blank. It is only by investigation carried on by an organized and well-appointed corps of scientific explorers that we can ever hope to have that knowledge which the world ought to possess ; and how interesting the knowledge will be is already indicated by the discovery of the Moabite Stone, and the remarkable ruins recently found by Mr. Tristan in his journey into Moab. It was in view of the great interest and importance of this investigation that the Palestine Exploration Fund was established in Great Britain about seven years ago, which, as supplementary to excavations in the City of Jerusalem, has organized a systematic survey of Palestine from the Mediterranean to the Jordan, under the superintendence of officers of the Royal Engineers. This survey is now in the field, and had up to last summer surveyed over 1,250 square miles. The survey is to be in part geological, and with it is connected a most searching archæological investigation, including the copying of inscriptions, the photography of ruins, and the making of collections in botany and natural history. What has been achieved by these English explorers is of the greatest interest ; and, as confirmatory of the connections of the early Syrian people with Great Britain in a remote antiquity, I may mention that the buildings recently found by Mr. Palmer in Palestine correspond to the minutest detail with buildings now existing in the Hebrides, in the Isle of Anan in Scotland, in the Bay of Galway,

and at Holyhead. I have said that the English exploration is to extend to the river Jordan. The American exploration is over the comparatively unknown region beyond it. It is peculiarly appropriate to us that we should take part in this work, for we may be said to have begun it. A quarter of a century ago our government sent an expedition, under the command of Lieut. Lynch, to explore the Jordan and survey the Dead Sea; which, I believe, was the first time that the difficult navigation of the Jordan was effected in boats, throughout its entire course, from the Sea of Tiberias to the Dead Sea, and we are therefore only following up a work which we have begun. The ruins of Egypt, and more recently of Assyria, Nineveh, and of Persia, have been explored; and why, may I ask, should Palestine be suffered to lie in neglect, — the land of the Bible, the neutral land between the great civilization of antiquity and the highway of the commerce of the past? Certainly that land has as much to tell, and will shed as much light upon the problem of history.

After an address by Prof. Hitchcock, Lieut. Steever entered into a brief explanation of his explorations, which will be published by the Palestine Exploration Society. Other addresses, commending the work of the Palestine Society, were made by the Rev. Drs. Washburn and Adams.

VI.

THE MOUNTAINS AND MOUNTAINEERS OF THE EAST-ERN CAUCASUS.

BY GEORGE KENNAN.

READ DECEMBER 16TH, 1873.

MR. PRESIDENT, LADIES, AND GENTLEMEN, — In the south-eastern corner of European Russia, between the Black Sea and the Caspian, in about the latitude of this city, there rises abruptly from the dead level of the Tatar steppes a huge broken wall of Alpine mountains, which has been known to the world for more than 2,000 years as the great range of the Caucasus. It is in some respects one of the most remarkable mountain-masses in the world. Its peaks out-rank those of Switzerland both in height and in rugged grandeur of outline; its glaciers, ice-falls, and avalanches are all upon the most gigantic scale; the diversity of its climates is only paralleled by the diversity of the races which inhabit it; and its history, beginning with the Argonautic expedition and ending with the Russian conquest, is more eventful and romantic than that of any other mountain-range in the world. Geographically the Caucasus is a portion of the boundary-line between South-eastern Europe and Western Asia; but it is not simply a geographical boundary, marked on the map with a red line, and having no other existence; it is a huge natural barrier, 700 miles in length and 10,000 feet in average height, across which, in the course of unnumbered centuries, man has not been able to find more than two practicable passes, — the Gorge of Dariel, and the “Iron Gate” of Derbend. Beginning at the Straits of Kerch, opposite the Crimea, on the Black Sea, the range trends in a south-easterly direction across the whole Caucasian isthmus, terminating on the coast of the Caspian near the half-Russian, half-Persian city of Baku. Its

entire length, measured along the crest of the central ridge, does not probably exceed 700 miles; but for distance it is literally one unbroken wall of rock, never falling below 8,000 feet, and rising in places to heights of 16,000 and 18,000, crowned with glaciers and eternal snow. No other mountain-range which I have ever seen presents, in an equally limited area, such diversities of climate, scenery, and vegetation. On its northern side lie the barren wandering-grounds of the Nogai Tatars,—illimitable steppes, where for hundreds of miles the weary eye sees in summer only a parched waste of dry steppe-grass, and in winter an ocean of snow, dotted here and there by the herds and the black tents of nomadic Mongols. But cross the range of the Caucasus from north to south, and the whole face of nature is changed. From a boundless steppe you come suddenly into a series of shallow, fertile valleys, blossoming with flowers, green with vine-tangled forests, sunny and warm as the South of France. Sheltered by its rampart of mountains from the cold northern winds, vegetation here assumes an almost tropical luxuriance. Prunes, figs, olives, and pomegranates grow without cultivation in the open air; the magnificent forests of elm, laurel, oak, colchian, poplar, and walnut are festooned with blossoming vines; and in autumn the sunny hill-sides of Georgia and Mingrelia are fairly purple with vineyards of ripening grapes. But climate is here only a question of altitude. Out of these very semi-tropical valleys you may climb in a few hours to the very limits of vegetable life, and eat your supper, if you feel so disposed, upon the slow-moving ice of a glacier.

If I were asked to compare the Caucasus, for the purpose of illustration, with some better-known range of mountains, I should say that it resembles a little in relative geographical position the Sierra-Nevadas of California. The vast treeless steppes which lie on its northern slope correspond roughly to the alkaline plains of Nevada and the warm semi-tropical valleys into which it falls on the south side resemble still more closely the valleys of Central and Southern California. But, of course, this parallel is very rough and inaccurate. So far as I know, the Caucasus has no parallel; and the general facts which can be affirmed of the Caucasian range as a whole are not very numerous. You can say that it is 700 miles long, that it is from 8,000 to 18,000 feet high, that with its spurs and secondary lateral ranges it is from 75 to 150 miles wide, that it has steppes on the north and fertile valleys on the south; and that is about all you can

say of it. Just as soon as you attempt to go into details, — to state the number of the parallel ridges which together make up the chain, to describe the character of its peaks or the general nature of its watersheds, — you must limit the field to which your statements apply. What you can say of one portion will not be at all true of another. I purpose, therefore, in this brief paper, to limit myself to the mountains and mountaineers of the Eastern Caucasus, including only that portion of the range lying between the fortieth and forty-fourth parallels of latitude and the forty-sixth and fiftieth meridians of longitude, — a region known to Russian geographers as Daghestan.

I visited the mountains of the Caucasus in the autumn of 1870. I went there partly to gratify a love of rough travel, and partly to study a comparatively unknown and highly interesting race of people, — the Caucasian mountaineers. I went as a sort of geographical "Uhlán", intending to skirmish a little with the difficulties of Caucasian exploration, and pick up what information I could for the future guidance of the general staff.

Leaving St. Petersburg in August, I took steamer at Nizhni-Novgorod, descended the Volga to Astrakhan, crossed the Caspian, and, early in September, landed at the little Russian port of Petrovskoi, near the north-eastern corner of Daghestan. From this point there were only two roads leading back into the interior, — one skirting the base of the range as far as Vladi-Kavkaz, and crossing through the Dariel pass to Tiflis; the other turning directly into the mountains, and ending about forty miles from the Caspian, at the Russian military post of Timour-Khan-Shoura. Beyond these two roads there were no means of interior communication, except bridle-paths. As my object was to get into the mountains as directly and speedily as possible, I hired a *tarantass* at Petrovskoi, took the last-mentioned road, and on the 18th of September found myself among the foot-hills of the great range in the walled town of Timour-Khan-Shoura, the head-quarters of the Russian provincial government.

It is unnecessary to detail here the difficulties which I met with in attempting to make up a party for an expedition through Daghestan and across the mountains. Suffice it to say, that on the 18th of September a Georgian nobleman (Prince Djordjadze) and I, with an armed escort of twenty-five mountaineers and a full force of interpreters, rode out of the Avaraki gate of Timour-Khan-Shoura into the mountains of the Caucasus. Our plan was to ride and climb through the province of Daghestan in a south-westerly direc-

tion, until we should strike the so-called snowy mountains near the head-waters of the Avarski-Koisu, and there make an attempt to cross directly into Georgia at a height of about 11,000 feet. If stopped by snow, Prince Djordjadze intended to return to Timour-Khan-Shoura, and go around by the Dariel pass, leaving me in winter quarters at some *aoul* near the main range, to study the people at my leisure.

The province of Daghestan, through which we purposed to travel, is a rather long and slender triangle, lying wholly on the north side of the Caucasian range, having for its apex the peninsula of Apsheron, on the coast of the Caspian; for its base, one of the spurs of the Caucasus known as the ridge of Ande; and for its sides, the Nogai steppe on the north, and the main ridge itself on the south. The greatest length of this triangle from east to west is about 275 miles, its width at its base something like 120, and its superficial area about one-third that of the State of New York. This comprises the so-called Eastern Caucasus. Its Turkish name, Daghestan (the land of mountains), is briefly but accurately descriptive of its character; for, although not the highest, it is one of the most broken and rugged portions of the whole Caucasian range. From side to side, and from end to end, it is nothing but mountains, precipices, gorges, and profound ravines. I hardly know how to convey, without a great deal of wearisome explanation, an adequate idea of the physical configuration of this region; but I will be as brief and as clear as I can.

Near the north-western corner of Daghestan there rises out of the main Caucasian range a sharp, snowy peak, or group of peaks, nearly 14,000 feet in height, known as Mount Barbale. At this mountain the central ridge of the Caucasus separates, as it goes eastward, into two parallel branches or arms, the southern arm being known as the main range, which slopes directly into the valley of Georgia; the other as the snowy range, which lies wholly in Daghestan. As regards height, they are at first nearly equal: but the main branch runs entirely through to the Caspian, without getting much lower; while the snowy range falls gradually, as it goes eastward, to 4,000 or 5,000 feet, and is finally lost among the spurs of its longer rival. Between these two mountain-branches there is a great elevated valley or trough, and in this trough rise three of the largest rivers in Daghestan, — the Andieski-Koisu, the Avarski-Koisu, and the Samour. Running at first in easterly and westerly directions through this elevated valley, the two Koisus finally force the snowy range

in two great gorges, and, flowing northward through Daghestan, unite and empty at last into the Caspian, after a fall of not less than 5,000 feet from the level of the trough in which they have their rise.

In order to give a very general but clear idea of the country north of the snowy range, including most of Daghestan, I will draw upon the board an imaginary transverse section of the mountains along the forty-seventh meridian of longitude. There may perhaps have been a time when, if the Caucasian range could have been cut down crosswise to its base through Daghestan, the section would have looked something like that. First, the main range chiefly composed of granite; then the elevated trough in which the Koisu rivers rise; then the snowy range, largely made up of argillaceous slate; and, finally, an immense inclined plane of calcareous and sandstone rock, more or less broken up, stretching from the snowy range to the Tatar steppes and the Caspian sea-coast. I do not know that this outline was ever a true one. I have drawn it only for the purpose of illustration; but I imagined from the present appearance of the Central Daghestan Mountains that they are the ruins of a sloping plateau or inclined plane which has been cut to pieces by the erosive action of water.

An actual transverse section of Daghestan to-day from north to south would look something like this. Air-lines drawn northward from the snowy range through the summits of the Daghestan Mountains would reproduce in outline that ancient sloping plateau; but it is now channelled, gashed, and furrowed everywhere by wonderfully deep and narrow ravines — altered almost beyond recognition. It seems at first sight incredible that running water in any conceivable lapse of time should be able to disintegrate and carry away such immense quantities of rock as have been disintegrated and carried away from Daghestan; that it should carve out such mountains as the peak of Goonib, such profound valleys as the gorge of Bognadafa; that it should cut a mountain-plateau into a perfect network of tremendous galleries which look as if an army of Titans had been digging parallels and carrying on siege-operations against the granite ramparts of the great range itself. But there are several reasons why the erosive action of water in Daghestan should be very rapid and powerful. In the first place, the rivers have an enormous fall even after they acquire considerable size and volume, and they consequently run with great rapidity. They are nearly all torrents. In the second place, the north slope of the Caucasus

here is now, and apparently has always been, perfectly bare and treeless, and the water runs off from it as it would from a roof. And, finally, the formation is one which is easily cut and undermined by water; and the fall of snow and rain on the snowy range and its northern water-shed seems to be exceptionally great. These are some of the reasons which account, I think, at least in part, for the present aspect of Daghestan; but, whether they do or not, it is certain that in no other part of the Caucasian range has running water produced such wonderful results as here.

The physical geography of the Daghestan watershed may be summed up as follows: The backbone of the country is the main Caucasian ridge, averaging about 10,000 feet in height, reaching in two or three places 13,000. The principal rivers rise between this ridge and the equally high snowy range, pierce the latter and flow through enormously deep and narrow valleys in a northward direction to the Nogai steppes, where they turn abruptly to the eastward, and empty into the Caspian. The characteristic features of this water-shed are, first, its flat-topped ridges and truncated cone-shaped mountains, seamed with strata of sandstone and calcareous rock, as in my rough sketch; and, second, the profoundly deep valleys, ravines, and gorges through which all its streams flow. It is almost impossible to exaggerate the depth, narrowness, and gloominess of these valleys. They are rarely more than 300 or 400 feet wide at the bottom, and are shut in by walls which rise steeply, sometimes perpendicularly, to heights of 1,500, 2,000, and 3,000 feet, broken occasionally into terraces by thick strata of limestone. These ravines render travel across the country extremely difficult. The getting-out of one and the entrance into another frequently involve five or six hours of hard climbing in tortuous zigzags; and, as a general rule, the distance of a cannon-shot across two or three of these ravines is a good day's work, as they can be entered and left only at certain favorable points.

There are no forests in the country except in the trough between the main range and the snowy range, and a few small trees in some of the valleys. Even fire-wood is extremely scarce, and timber for Russian houses has to be rafted down the Volga and across the Caspian to Petrovskoi. There are no lakes anywhere except one small one at a height of 6,100 feet on the ridge of Ande.

The climate varies, according to location and altitude, from the climate of New York city to that of Siberia. On the steppes north of Daghestan spring begins in March, in some of the deep, sheltered

valleys, in February; and on the mountain-plateaus, up to a height of 5,000 or 6,000 feet, in May. The line of perpetual snow on the main Caucasian range is a little above 10,000 feet; on the snowy range it falls somewhat lower. A few small glaciers descend from the higher peaks of the main range on the northern side, but none that can be compared in point of magnitude with those of the Central Caucasus between mounts Kazbek and Elbrooz.

Considered physically and geographically, such, in rapid outline, is the province of Daghestan. It only remains to sketch hastily the origin and history of its inhabitants before coming to my personal experience of Caucasian travel.

The inhabitants of the Russian government of the Caucasus, which includes a strip of country about 100 miles wide on each side of the range, may be roughly divided, as regards race, religion, and geographical distribution, into three great classes. First, the Christian Aryan lowlanders who live in the warm valleys of Georgia, Kahetia, and Mingrelia, on the south side of the range; second, the Buddhist Mongol Tatars who wander over the steppes on the north side; and, third, the nondescript Mahometan highlanders who live in the mountains between.

All of these three great classes, except, perhaps, the Nogai Tatars, occupied nearly their present positions at the very dawn of history; and it is impossible now to ascertain, with any degree of certainty, which came first. One thing, however, may be safely asserted, and that is, that for at least 1,000 years the highlanders, — the true Caucasian mountaineers, — have been the dominant race, and to this race I ask your attention. It was made up originally of representatives from almost every nationality known to ancient history. The Aryan races, as they migrated westward from Central Asia, left a few stragglers in the Caucasian Mountains, their number being increased by deserters from the Greek and Roman armies of Alexander the Great and Pompey; the Mongols, under Tamerlane, as they marched through Daghestan, added a few more. The Arabs who overran the country in the eighth century established military colonies in the mountains, which gradually mingled with the previous inhabitants; European crusaders, wandering back from the Holy Land, stopped there to rest, and never resumed their journey; and, finally, the oppressed and persecuted of all nations — Jews, Georgians, Armenians, and Tatars — fled to those rugged inaccessible mountains as to a city of refuge where they could live and worship their gods in peace. In the course of time these innumerable frag-

ments of perhaps a hundred different tribes and nationalities, united only by the bond of a common interest, blended into one people, and became known to their lowland brethren as *gortze* or mountaineers. From a mere assemblage of stragglers, fugitives, and vagabonds, they developed, in the course of four hundred or five hundred years, into a brave, hardy, self-reliant people; and as early as the eighth century they had established in the mountains of Daghestan a large number of so-called *volnea obshchestva*, or "free societies", governed by elective franchise, without any distinction of birth or rank. After this time until 1859 they were never conquered. Both the Turks and the Persians at different times held the nominal sovereignty of the country, but as far as the mountaineers were concerned it was only nominal. Army after army was sent against them, only to return broken and defeated; until at last among the Persians it passed into a proverb, "If the Shah becomes too proud just let him make war with the mountaineers of the Caucasus."

In 1801 these hitherto unconquered mountaineers came into conflict with the resistless power of Russia, and after a desperate struggle of fifty-eight years they were finally subdued, and the Caucasus became a Russian province. At the present time the Caucasian mountaineers as a class may be roughly described as a brave, hardy, semi-barbarous people, differing widely among themselves in outward appearance, but much alike in character, and united in their devotion to liberty. They number altogether between 3,000,000 and 4,000,000, speaking upwards of forty different languages and dialects, and are settled throughout the range of the Caucasus from the Black Sea to the Caspian, at a height of from 3,000 to 4,000 feet.

There are two widely-spread errors with reference to the Caucasian mountaineers which it may be well to notice,—first, that they are all, or nearly all, Circassians; and, second, that the Circassians, properly so-called, were the most determined antagonists of Russia in the Caucasian war. Both these popular opinions are wide of the truth, although they have apparently misled as well-informed travellers as Capt. Burton, and more recently Sir Arthur Cunyng-hame.

The mountaineers of the Caucasus are not all Circassians any more than the inhabitants of Constantinople are all Greeks. The true Circassians form a comparatively small portion of the mountain-population, and are settled only in that part of the range which

borders the Black Sea. They have been taken as representatives of the whole race of Caucasian highlanders simply because from their location they happened to become better known to Europeans than the equally powerful Lesghians of Daghestan or the far fiercer Chechenses of Ichkeria. In the second place, the Circassians were not, as a matter of history, any more determined in their resistance to the Russian conquest than the mountaineers of Daghestan. Shamyl; the great hero of the Caucasus, was not a Circassian. He was a Lesghian, and never saw Circassia. The last organized resistance to Russia in the Caucasus was not made by the Circassians. It was the heroic attempt of Shamyl and 300 Lesghians to hold the peak of Goonib in Central Daghestan against 28,000 Russian Cossacks under Prince Baratsinski. The defeat of Shamyl in Daghestan was the Waterloo of the Caucasian highlanders, not the last battle on the coast of the Black Sea. And in thinking of the Caucasians we must remember that the Caucasian mountaineers as a whole are made up of fragments of almost every race and people in Europe and Western Asia, from the flat-faced Mongol to the regular-featured Greek, and that the Circassians are only one of these fragments. How such a heterogeneous collection of the tatters, ends, and odd bits of humanity ever blended into one coherent and consistent whole I don't know; but there they are, offering problems to ethnologists and comparative philologists which will be found very hard to solve.

It would be impossible to give you an idea of the Caucasian mountaineers without showing you their peculiar and picturesque costume; and if you will excuse me for a moment I will transform myself as nearly as possible into a Lesghian of our escort. If you can imagine twenty-five or thirty mountaineers — swarthy, black-bearded men dressed in this costume — riding in a body up some dark ravine, shouting out in chorus a wild Daghestan war-song, you will have an idea of our escort as it first appeared to me. In such strange company I almost doubted my own identity; and as the clear, excellent strains of the savage battle-hymn came echoing back from the mountain-cliffs under which we rode, mingled with the clattering of a hundred hoofs and the sharp clank of sabres against ringing stirrup-irons, I half imagined myself a moss-trooper, or a knight of the fourteenth century making a raid into the territories of a hostile baron. The whole atmosphere seemed filled with the warlike, adventurous spirit of the Middle Ages; and if Prince Djordjadze had only suggested making an attack upon the very next village we

came to, I was just in a state of mind to draw my revolver and dash into the fray with all the enthusiasm of a crusader.

At the first few villages after leaving Timour-Khan-Shouræ the mountaineers had been apprised of our coming, and they met us with the most startling and warlike ceremonies. At the *aoul* of Toongootai, for instance, a large body of them, splendidly mounted and glittering with silver-sheathed daggers and cartridge-tubes, came galloping out of the gate of the village while we were yet a quarter of a mile away, and dashed down upon us in a long curving line, like the light brigade at Balaklava. Shouting and yelling and firing pistol-shot after pistol-shot over our heads, on they came at a swinging gallop until they were within ten feet of our escort; then, reining their horses suddenly back upon their haunches, they stopped, stood poised for an instant in a superb battle-tableau, and then broke out into a great shout of "*As salaam aleikoum!*" ("Peace be with you"); and, dismounting from their high Tatar saddles, advanced on foot to shake hands with Prince Djordjadze.

It was a magnificent ceremony, — a ceremony worthy of a warlike people; but I thought I could suggest one improvement, and that was that they should shout "Peace be with you" before they started, so that an inexperienced traveller need not, unnecessarily prepare himself for sudden death.

At all the large *aouls* in Northern Daghestan where Prince Djordjadze was known we were received with boundless hospitality. Cattle and sheep were slaughtered without mercy, everything that the country afforded was set before us, entertainments were gotten up in our honor; and night after night we sat at the door of some mountaineer's house, a bonfire blazing in the court-yard, and listened to the songs of the Lesghians, or watched the brilliantly dressed men and women whirling in the strange national dance called the Lezginski to the barbaric music of fifes, kettle-drums, and tamborines.

The inhabitants of Northern Daghestan, living in comparatively wide and fertile valleys, and within easy reach of a market for their productions, are much more wealthy than those farther back in the mountain, as well as more civilized. We soon left behind us, however, these hospitable villages, and plunged into the wonderful labyrinth of dark ravines in Central Daghestan. No description can do justice to the savage wildness of some of this scenery. The road, or rather the foot-path, winds through profound ravines with almost precipitous sides — now descending to the edge of a roaring torrent,

now climbing in a series ten or fifteen shelf-like zigzags to a height of 1,000 feet, running for a quarter of a mile along the brink of a tremendous precipice; climbing again half a dozen more zigzags, crossing a divide, and finally plunging into a valley equally dark, gloomy, and precipitous on the other side. These roads are extremely trying to inexperienced nerves. Frequently for an hour at a time you look down directly past one stirrup 400 or 500 feet, and your head will sometimes whirl in spite of your strongest self-control. I have seen a Russian officer obliged to dismount, sit down on one of these shelf-like paths, and cover his face with his hands until he had recovered from his dizziness. To conceal my own fear from Prince Djordjadze and the mountaineers in all these bad places I used to strike up a song, generally the popular negro melody of "Kingdom Coming," and indeed I thought sometimes that kingdom was coming. Some of these gorges are ten or fifteen miles long and 2,000 feet deep—like that of Bognadala, immense natural galleries, carpeted with grass, frescoed above with drifting clouds and having whole villages hung against their walls for pictures.

As we gradually approached the snowy range the *aouls*, or mountain-villages, became more and more daring and picturesque in their locations. Settlements in the valley-bottoms became less and less frequent, and finally disappeared altogether; while high overhead, every precipice, every projecting cornice of rock, was crowned by the castle-like, windowless stone houses of an *aoul*. As the inhabitants of this region have been almost constantly at war for centuries with somebody, fighting among themselves for amusement in dull seasons, they have learned to build their villages in places which can be easily defended, and from the bottom of the valley they look like eagles nests—perfectly inaccessible. The *aoul* of Achan, for instance, in South-western Daghestan, where we spent one night, stands on a shelf of rock not less than 2,000 feet above the valley of the Avarski-Koisu, and looks as if it might be defended by a dozen men against a thousand.

On account of the scarcity of wood all the houses are built of roughly broken stone in irregularly shaped fragments. They are two or three stories in height, with flat roofs, and are arranged generally in tiers one above another, like the seats in a theatre, or like a Titanic flight of steps; so that the upper story of every house has an outlook and a front yard made by the roof of the next house below it. The windows are mere port-holes in the wall about fourteen inches square; and as the mountaineers have no glass, or sub-

stitute for glass, these are either left open altogether, or closed with wooden shutters. The lower story, which is partly dug out of the mountain-side, seldom has windows of any kind, and is used chiefly as a stable, the inhabitants living above. Inside, the walls and floor are of beaten clay mixed with chopped straw and are generally bare. Against the wall, on one side, are suspended half a dozen huge round copper trays burnished like Roman shields, and on a shelf above them stands earthen water pitchers of antique shapes, wooden bowls, copper kettles and various other household utensils. The second wall is occupied by the bedding of the family, which is piled up against it to a height of six or eight feet, and covered with a striped cotton cloth. In the third wall are the door and the fire-place, and from the fourth projects a low, raised divan the whole width of the room, covered with a Persian rug. On pegs in the posts which support the ceiling, hang daggers, pistols and sabres, and a long rifle stands in the corner beside a bag of wheat, millet, or oats. In some of the wilder parts of the country, as, for instance, in the territory of the Didoitse, you will also see nailed against these posts the bones and shrivelled muscles of a man's hand or two,—the ghastly trophies of some battle or blood-revenge. The atmosphere is pervaded by a strong, peculiar odor made up of the smell of greasy goatskins, of the stable underneath, and of two or three lumps of fat, which hang over the fire-place, and which prove, upon examination, to be the tails of Caucasian sheep.

Such is the interior of a Daghestan mountaineer's house, and a dismal interior it is, especially in bad weather, when the little port-holes are closed to keep out the snow, and you sit cowering in the dark over a few embers, listening to the howling of a mountain-wind.

The mountaineers of Central and Southern Daghestan support themselves chiefly by keeping large flocks of sheep and goats, which they pasture upon the mountains. They also cultivate, in the valleys where they can, a little wheat, corn, millet or rye, and sometimes cut the sloping side of a ravine into terraces and cultivate that. Arable land is very scarce and valuable. According to a Daghestan proverb, good soil is worth the price of the kid, sheep, or cow that covers it in lying down. It was undoubtedly this scarcity of tillable land that led the mountaineers to begin those plundering raids into the valley of Georgia, which finally became such a terrible scourge to the people of that beautiful but unfortunate country.

For more than a thousand years the Lesghians of Daghestan were a veritable sword of Damocles suspended from the snowy heights of the Caucasus over the fertile valleys on the south side of the range; and as often as that terrible sword fell, it reddened the clear streams of Georgia with the best Christian blood, and filled the sunny valleys of the Alazan and the Koor with the smoke of burning villages. Compare a mountaineer's dagger with one of his wretched ploughs, and you will at once see the direction which his genius has taken and the means by which he has obtained a livelihood. It may be said of him almost literally, that he was born with a dagger in his hand, and nature furnished him with a motive for using it.

I have spoken several times, I believe, in this paper, of the Lesghians; and the name reminds me that I have not yet given any account of the tribes which inhabit Daghestan or of their political organization. The population of the province, according to the best obtainable information, is about 400,000, and all that I have said of the Caucasian mountaineers in general applies strictly to the Daghestan mountaineers in particular. They are a heterogeneous collection of miscellaneous elements. More than 5,000 of them are Jews, — lost in these wild ravines as effectually as the tribes which never came back from Babylon. Some of them are modern Europeans, as, for instance, a colony of Christians said to be the descendants of crusaders settled among the high peaks of Tooshetia, who still preserve as heirlooms the suits of armor marked with white crosses, which their forefathers wore to the Holy Land, in the days of Richard the Lion-hearted; and quite a considerable number of them are outwardly Northern Europeans, — men with fair skin, light hair, and blue eyes, like the Germans of Tacitus. The smaller fragments are beyond counting and beyond description. What they are and whence they came, I cannot even guess. You can get something of an idea of the nature of the population from their languages. I can count up ten different Daghestan languages by name, all of which are mutually unintelligible to their respective speakers, and it is said by the Russians, that, including dialects, there are twenty-seven. There is one small village in Southern Daghestan, called Innookh, — a village of only twenty-eight houses, — which has a language of its own, not spoken, so far as known, by any other portion of the whole Caucasian population.

Nearly all of these mountain-languages abound in strange, uncouth sounds, which a foreigner finds it extremely difficult to imitate.

Such, for instance, are the strangling articulations of the Tavliuski mountaineers, known, I believe, to philologists as "clicks" — I cannot make these sounds, although I tried faithfully to learn them. A mountaineer once gave me to pronounce a sentence in his native language, which corresponded to our children's "Peter Piper picked a peck of pickled peppers;" only instead of the labials it had clicks, of which he told me there were four different kinds. It was certainly the most extraordinary combination of sounds that I had ever heard, although I was familiar with the languages of a good, many barbarous people. It meant, he said, "to tie a man hand and foot, and throw him over a precipice." I told him frankly that he might tie me hand and foot and throw me over a precipice, but he couldn't teach me any such language as that. None of these mountain-languages have ever been written, nor can they be. The only medium of written communication in Daghestan is the Arabic, which is understood by most of the Mahometan *moolahs*, or priests. The Viceroy of the Caucasus has committed to Gen. Oosler and Col. Geetchinkow, two Russian philologists, the task of studying and classifying these languages. They have already published vocabularies and grammars of four or five of them, and Gen. Oosler is now at Timour-Khan-Shoura collecting materials for more. They had found, they told me, strange archaic forms of numerous Aryan and Semitic languages, various dialects of Tatar and Mongol origin, and a few which had no discoverable connection with any known tongue. Further investigation will, doubtless, reduce somewhat the number of radically different forms of speech in the Eastern Caucasus; but enough will remain to show that it deserved the christening which Strabo gave it, when nearly 2,000 years ago he called it the "mountain of languages."

The political organizations of the Daghestan mountaineers previous to the Russian conquest were of two kinds, — hereditary khanates and "free communities." The khans were the descendants of the old Arab conquerors, and were six in number. They governed about 125,000 of the population, mostly in the northern part of the province. The free communities numbered forty-three, and embraced 275,000 souls or more, settled principally along the north slope of the snowy range, and in the valleys between it and the main range. These free communities were nothing but republics in their most primitive form, ruled by assemblies like the *Things* of the Scandinavians, and sometimes having a presiding officer, —

all elected by popular vote. There were only two ranks, freemen and slaves; the slaves being mostly Georgians and Persians, captured by the mountaineers in their raids through the valleys, on the south side of the range. It might be interesting to compare the civil institutions of these free communities with those of the Northmen, which they greatly resemble; but I have not time, as I wish to describe, briefly, at least, some of their remarkable customs and laws. While travelling through Western Daghestan, Prince Djordjadze and I stopped one day in an *aul* called Bezheets. A large number of mountaineers collected in the house which we occupied to stare at the new comer; and while I was watching them a man entered, wrapped in a large, white cotton cloth which resembled a sheet. He seemed to be in search of somebody, and in a moment he stepped up to another mountaineer, and began in a very excited and vehement manner to talk to him. I could not, of course, understand what was said; but the other mountaineers all crowded around, and, after a few moments of excited debate, the man who had been thus rudely accosted, left the house. He was gone perhaps twenty minutes. He returned, bringing in his hand forty rubles Russian paper money, which he gave to the man who had first addressed him, and took in exchange the large white cloth in which the latter had been wrapped up, together with a small silver coin worth, perhaps, twenty cents.

The whole transaction was perfectly incomprehensible. Upon inquiry it appeared that six months previous to this time a certain man had lost a horse. At the end of four or five months he heard of his lost horse as being in the possession of a mountaineer in a neighboring valley. He wrapped himself up in a white cloth, took his weapons and a small silver coin, and, accompanied by witnesses, went to the mountaineer to demand the return of his property. The white cotton cloth was a burial shroud, the silver coin was to pay a priest for reading prayers over a grave, and upon the result of the negotiation depended the question whose shroud and whose grave they should be, his or the other man's. The shroud and the money were intended to be significant of his determination to have his rights at all hazards. If his adversary returned the horse peaceably, well and good; if not, he would fight for it; and he showed that he had fully considered the consequences by coming in a burial shroud, and bringing with him money to pay the expenses of his own funeral. It was either a horse or a grave for somebody. In this instance the horse was peaceably returned, and the owner trans-

ferred the shroud and the silver coin to the other man, who wrapped himself up, took his weapons, and started in search of the mountaineer who had sold the animal to him. He wanted a return of the money which he had paid. In this way the shroud and the coin had been through six or eight different hands when I saw them, and were still on their way back to the man who had originally found the horse or stolen him. He would have to refund the amount which he had received for the animal when he sold him, and then, if he were not guilty of theft, the whole question would be dropped, the shroud and the silver coin remaining in the hands of the last man. This is one of the so-called "*adats*" or customary laws of the Daghestan mountaineers, and it prevails over all the southern part of the province. It is no more peculiar, perhaps, than many others which I could mention if there were time; but it happened to be the first one which came under my observation, and the one which led me to study the extraordinary system of jurisprudence which exists in the Eastern Caucasus. I will try and give a brief outline of it. The laws of the Daghestan "free communities" are of two kinds,—first, the *shariat*, or written law of the Koran; and, second, the *adat*, or unwritten law of custom or precedent. The first was introduced by the Arabs with the Mahometan religion in the eighth century, and the last has existed from time immemorial. All questions concerning religion, family relations, wills, and inheritance are decided by the Koran; while all criminal cases, including personal injuries, violations of the rights of property-holders, and infractions of public regulations, are tried by *adat*, or the law of custom. Every *aul*, or village, elects by popular vote a certain number of jurymen, called in the Koomik language *karte*, whose duty it is to try all cases in accordance with the general law of the Koran or the customary law of that village. These jurymen assemble at stated times, either in the open street or upon the square in front of the mosque, to listen to complaints. The trial of every case begins with the statement of the plaintiff or person having a direct interest, is followed by the statement of the defendant, then by the examination of witnesses or the oaths of compurgators, and is finally decided by a majority of the jurymen. The witnesses are sworn and examined as with us; but not every man is legally competent to be a witness. Relatives of the plaintiff having a direct interest in the case are not permitted to testify; neither are persons having a pending lawsuit with the defendant, nor debtors of the defendant until they have paid their debts; nor persons having blood-

revenge against him; nor persons who have made a vow never to take an oath. Women are admitted as witnesses only in one free community, in the Darginski Okroog; and there the husband or brother takes the oath instead of the woman herself. Every witness swears that he will tell the truth, either by the name of God or by the legality of his marriage. The last oath is the oldest, and is considered the most sacred. If a man perjure himself, and the fact of his perjury be proved, he is compelled to separate at once from his wife. If he has more than one wife, he is required to state beforehand by which of his marriages he wishes to swear, so that the proper wife can be divorced. Besides the testimony of witnesses, which may be called direct proof, the law admits, in many cases, indirect or negative proof; or, in other words, allows an accusation to be brought against a man by suspicion. In this case the defendant can only clear himself by taking the oath of purgation, with a certain number of compurgators, part of whom he selects himself, and part of whom are chosen from his relatives by the accuser. The number of these compurgators varies from twelve to seventy, according to the nature of the accusation.

If a single one of them refuses to swear that he believes the defendant to be innocent, he is considered guilty. Sometimes the plaintiff himself takes the oath, also supported by compurgators, part of whom are chosen by the defendant and part by himself. If they unanimously swear that they believe the defendant to be guilty, guilty he is. The option of taking the oath himself or requiring it of the defendant rests wholly with the plaintiff; but accusation by suspicion is permitted only in the absence of direct proof. The number of persons who can be successively accused of the same crime varies from one to seven. It will be seen that this is simply the old English custom called the *wager of law*, but it is extremely remarkable that a custom which everywhere else in Europe has been obsolete for a thousand years should still survive in the mountains of Daghestan. As regards the *adats*, or customary laws, themselves, they differ as widely as the people who observe them. The free communities of Daghestan, in the first place, are very differently situated — they are made up of diverse elements, and are at different stages of culture and development. Cases for which there were no *adats* have been decided according to the best judgment of the jurymen, thus establishing new precedents; and the result of all these causes is a remarkable dissimilarity in the *adats* of different parts of the country. Almost every settlement has its own laws, differing more

or less from those of its neighbors. All crimes except murder, bridge-burning, grave-robbing, and a few other offences, are punished by fine, imprisonment, or banishment from the settlement. Murder renders a man liable to blood-revenge, but is not otherwise punished. Blood-revenge has prevailed in Daghestan for more than 1,500 years; and, in spite of all the efforts of the Russian government to put it down, it prevails still. In the year 1867, for instance, there came to the knowledge of the Russian authorities, in that part alone of the province over which they had actual jurisdiction, no fewer than 142 murders, — most of them murders of blood-revenge. When one man murders another in Daghestan, for any reason whatever, it becomes the sacred duty of the murdered man's nearest relative to avenge his death. So soon as a homicide becomes known, the relatives of the murdered man and the relatives of the murderer, all armed to the teeth, assemble in separate houses for the purpose of consultation. At that time any relative of the murdered man has a legal right to kill any relative of the murderer, provided he can do so in the open air. A house in Daghestan is sacred; and every mountaineer would consider it an eternal disgrace to violate that sanctuary, even for the purpose of killing a blood-enemy. The relatives of the murderer, therefore, do not stir out of doors until they receive — generally in a day or two — an intimation that the other party is willing to make peace. The two hostile families are then led out, by mutual friends, to the open square in front of the village-mosque; and the *moolah*, or Mahometan priest, stands between them, and reads aloud the first chapter of the Koran. At the end of this ceremony all hostility between the relatives of the murderer and the relatives of his victim is at an end; but this treaty of peace does not, of course, include the guilty individual. He by this time has "gone into *kaule*"; that is, fled from the village and taken refuge with some friend in another settlement. From that time forward he is hunted by the relatives of the murdered man like a wild beast. So long as he stays in a house, he is safe; but if he ventures once out of doors, he does so at the peril of his life. Even his head shown at a window is liable at any moment to be shattered by a pistol-ball. Sometimes the relatives of the murdered man keep him in some house in a state of perpetual siege. If he makes his escape to a distant part of the province, his situation is very little improved. Every one is obliged to afford him refuge and give him food; but no one dares to travel with him. He is forbidden to cultivate the soil; and he wanders about from place to place, in constant terror for his life. It is the custom of all Mahometans to shave

their heads; but if the murderer repents of the crime which he has committed, and desires to make peace with his blood-enemies, he allows his hair to grow out long. This soon comes to the knowledge of the latter; and at the expiration of a year or two they sometimes send word to him that they are willing to make peace. In such a case, the murderer wraps himself from head to foot in a white burial-shroud, belts on a long double-edged dagger, and goes with uncovered head to the house in which his enemies are assembled. The burial-shroud, dagger, and uncovered head, signify that he repents of his crime, and submits himself entirely to the mercy of the men whom he has injured. He presents them with the dagger, holding it by the point, and stands before them unarmed, in a simple white shroud, as an intimation that he is ready to be killed and buried, if they so please. The father or elder brother of the murdered man then rises, and strokes the murderer's head gently with one hand, as a sign of forgiveness. The culprit may then consider himself safe.

The laws relating to blood-revenge abound in strange features; but I will confine myself to two or three of the most noticeable. In the *aoul* of Bootlee, on the ridge of Andee, if a man were found killed, and it were not known who had killed him, his relatives assembled in front of the mosque, fixed arbitrarily upon some individual, whom they thought most likely to be guilty, and sent for him. If he came, they examined him, and killed him or not, as they thought best; if he did not come, or could not be found, it was considered proof of his guilt, and he was declared a *kanle*, or blood-enemy. Of course, such customs as these led to endless bloodshed; and two families would sometimes fight each other almost to the point of extermination. In Southern Daghestan, a man who deliberately sets fire to a bridge becomes the blood-enemy of the whole settlement which lies nearest to the burned structure, and may be lawfully killed by any inhabitant of that village,—man, woman, or child. In general, it may be said that a man who commits a crime of such a nature as to reflect disgrace upon a whole settlement, becomes the blood-enemy of that settlement. Among such crimes are bridge-burning, and the robbery of a grave or a mosque.

I have left myself little time to speak of the better side of the Caucasian mountaineer's character,—the side shown in his stories, songs, and amusements. He is not altogether a murderer or a robber. He has many noble qualities and strong human feelings. He is brave; he is hospitable and generous to a

degree which we would call fanaticism; he will treat a friend like a brother, as I know from personal experience; he is passionately fond of music, skilful in metrical improvisation, and sometimes gifted with a deep vein of poetic feeling. To illustrate some of those points I will give here translations of two Daghestan songs, rendered as literally as possible through the Russian. The first is called the "Song of Khamsat", Khamsat, a Daghestan warrior, having crossed the river Tirk through the Russian lines with a few bold raiders, was cut off by a large force of Cossacks, surrounded on the top of a low hill, and, after a desperate defence, was killed, with all his followers. The song was composed to commemorate this tragedy. It is supposed to be sung by Khamsat himself just before the last Russian onset. Seeing a bird flying over the field of battle in the direction of his native village, he addresses it as follows:

"O aerial bird! carry to Akhverdi Mahomet, the ruler of Hikka, our last farewell!
 Bid good-by to our sweet-hearts, the fair girls of Hikka.
 Tell them that our breasts are a wall which will stop the Russian bullets.
 Tell them that we had hoped to lie in the graveyard of our native village,
 Where our sisters would have wept over our graves,
 Where sorrowful relatives would have gathered to mourn our death.
 But GOD has not granted us this last favor.
 Instead of the weeping of sisters over us,
 Will be heard the growls of fighting wolves;
 And instead of sorrowful relatives will assemble clouds of croaking vultures.
 The vultures will drink up our eyes;
 The bloodthirsty wolves will devour our bodies.
 And, O bird! tell them all that on the Chirkatski mountains,
 In the land of the Russian infidel, with naked sabres in our hands,
 We all lie dead!"

I do not know in any literature a song which breathes such a spirit of fierce, indomitable heroism as this. The other specimen is called the "Death Song of the Chechense". It is supposed to be sung by the spirit of a mountaineer who has been killed in battle:

"The earth is drying on my grave, and thou art forgetting me, O my own mother.
 The weeds are overgrowing my burial-place,
 And they deaden even thy sorrow, O my aged father.
 The tears are dry in the eyes of my sister,
 And from her heart the misery is passing away.
 But do not thou forget me, O my elder brother,
 Until thou shalt have avenged my death;
 And do not thou forget me, O my younger brother, until thou shalt lie beside me
 Thou art hot, O bullet, and thou bringest death;
 But hast thou not been my true slave?
 Thou art black, O earth, and thou coverest me;
 But have I not spurned thee under my very horse's feet?
 Thou art cold, O death;
 But I have been thy master.
 My body is the inheritance of earth,
 But my soul rises in triumph to heaven."

You will notice how he is represented as exulting over the bullet which has killed him, over the earth which covers him, and even over death, declaring that he has been the master of them all. I might talk for the remainder of the night, and I could not give you a better idea of some of the distinguishing characteristics of the Caucasian mountaineers than you will get from these two songs.

In describing the physical geography of Daghestan, I referred, I believe, incidentally, to the so-called peak of Goonib. Prince Djordjadze and I reached this mountain on the 24th of September. It resembles, in shape, a huge inverted bowl. Its summit is a plateau five miles long by three in width, elevated 6,500 feet above the Caspian, and about 3,000 feet above the surrounding valleys. As a mountain it is isolated from the rest of the country by deep ravines. About 200 feet below the summit it is girdled by a belt of precipices, formed by the sudden breaking-off of thick, horizontal strata of some rock, resembling limestone. These precipices run entirely around it, and are everywhere perpendicular, or nearly so, except on the north side, where a small stream falls over upon an extensive terrace, and then into the valley. The top of this mountain was the scene of the last desperate struggle between the Daghestan mountaineers and the forces of Russia. Defeated, utterly, at Veden in 1859, the great Caucasian leader, Shamyl, with the fragments of his shattered army, fled across the mountain-ridge of Ande, posted himself with only 300 of his devoted body-guard upon the heights of Goonib, and prepared for his last struggle. He was now a gray-haired man, sixty years of age. He had fought the Russians thirty-seven years, — his whole life had been one long battle, — and he now saw it closing in defeat and disaster. But his spirit was unbroken. All the Russian forces in Daghestan — some 28,000 men, under Field-marshal Baratinski — surrounded the mountain; and a flag of truce was sent to Shamyl to demand his surrender. His reply was brief but emphatic. I give his exact words from the Russian history of the war: "Tell Prince Baratinski I will never surrender. Goonib is a high mountain, and I am on its summit, and God is over all. Your Russian soldiers stand below. *Post shtormooyout* (let them take us by storm)." Storming the heights of Goonib seemed at first sight to be as impracticable as storming the gates of heaven. It could not be bombarded nor taken by starvation; for Shamyl, with the wise provision of an experienced leader, had previously caused large flocks of sheep and goats to be transported to the summit of the mountain, and was provisioned for an indefinite length

of time. Day after day, week after week, the siege went on with out making the slightest progress. Storming-party after storming-party was sent up the one narrow zigzag path on the north side of the mountain, only to be driven back shattered and broken under the deadly fire of Shamyl's riflemen. Night after night the beleaguered mountaineers looked down from their lofty perch upon the vast circle of a thousand camp-fires which marked the lines of the besieging army; but no thought entered their minds of surrender. Shamyl had inspired his men with his own lofty heroism; and, hopeless though they knew the struggle to be, they were ready to fight it out to the bitter end. It was a sad and yet a glorious sight to see a mere handful of 300 men intrenched among the clouds, a mile and a quarter above the level of the sea, bidding defiance to an army of 28,000 veteran soldiers, backed up by the resources of a powerful empire. Everywhere else organized resistance to the Russians had ceased. Circassia was conquered; Kabarda was subjugated; Chechetnia was overrun by Russian troops; Northern Daghestan was in the hands of the Russians; Southern Daghestan was in the hands of the Russians. Shamyl, with 800 men, held the peak of Goonib. All Russia watched with deep and absorbing interest that lonely mountain-top where was being played out the last act in the great tragedy of Caucasian independence. The catastrophe came soon. Field-marshal Baratinski, with the dogged persistence of the true Russian soldier, never relaxed for an instant the grasp in which he held that mountain, until he had matured a plan for its capture. The only path leading to the summit was on the northern side; and here, behind a low stone wall, Shamyl had concentrated his small force. Everywhere else the mountain was believed to be perfectly inaccessible, girdled as it was with precipices; and on the southern side he had not thought it necessary to post even a sentinel. At this neglected point, small parties of Cossacks, with the aid of grappling-irons and spikes driven into the cliffs, succeeded in reaching the summit unobserved, and in making fast ropes. It was the night of the 24th of August. Orders were instantly given for a storm. There was still time for Shamyl to throw his courage and his energy into the trembling balance of his fortunes, if he had only known it. A hundred men distributed along the southern cliffs might have laughed at Baratinski and all his army; but there was not a man there. Three miles away across the mountain-top, unfortunate Shamyl, ignorant of his impending ruin, sat patiently watching what he supposed to be the only vulnerable point

in his defences, — the path and the stone wall. In a few hours all was too late.

While yet the muezzin's call to midnight-prayers (" *Allahu akbar* ") came floating musically down from the rocky battlements of Goonib to the camp of the besieging army, long lines of dark, shadowy forms might have been seen climbing the cliffs on the south and east sides of the mountain. They were picked storming-parties from the Apaheronski and Samourski regiments, under the direction of Baratinski's bravest officers. No alarm was given, not even the clank of a sabre was heard as the long lines of men climbed heavenward; and yet the last moments of Shamyl's career were being checked off one by one, as man after man clambered over the edges of those cliffs. At daylight there were 1,400 Cossacks on the summit; and, marching swiftly across the bare mountain-top, they fell upon Shamyl and his astounded *murids* like a thunderbolt from a clear sky. The rattle of musketry was the signal for the advance of still another storming-party up the path on the north side of the mountain; and Shamyl suddenly found himself attacked in front and rear by an overwhelming force. Surprised, outnumbered, surrounded, nothing remained for the unfortunate mountaineers except death; but they died hard. Shamyl himself, with a part of his *murids*, was shut up in the little *aoul* and captured; but about a hundred men gathered on the brink of the precipices which overlook the northern valleys, and fought with the fierceness of despair. The shrill rallying-cry of the line Cossacks (" *Oorá bratze fperot* ") mingled with the hoarse guttural, " *Allahu akbar* ", of the despairing mountaineers as they threw themselves, dagger in hand, upon the Russian bayonets. The struggle was bloody but short. One by one, the mountaineers fell under bayonet-thrust and pistol-shot, — dying fiercely, silently, until only a few wounded and bleeding men were left. They, seeing that all was lost, pulled their heavy sheep-skin caps over their eyes, and, with the word *Allah* (God) upon their lips, sprung from the edge of the cliff, and took death at a flying leap. A few crushed, shattered, dismembered bodies lying among the rocks at the base of that cliff were all that remained to show how bravely had fought, how faithfully had died, the forlorn hope of the Caucasus.

In the Russian museum at Tiflis there is a large cast or relief-map of the mountains of the Caucasus; and on that map the peak of Goonib is represented by a little knob of gold. It was gilded in honor of the soldiers who stormed the mountain; but its golden

lustre brightens also the memory of the brave but unfortunate men who died in its defence.

I have not been able to go at all into the details of the journey of our party through South-western Daghestan, and there is not now time to do so. We met with no obstacles which could not be overcome by hard riding and hard climbing, the mountaineers everywhere received us with the most cordial hospitality; and the weather was generally perfect until after we crossed the snowy range. Then it became cold and threatening as we were at a height of about 7,000 feet. On the 3d of October, from the Lesghian village of Bezhuta, we began the ascent of the main ridge of the Caucasus. We started up the mountain in a zigzag path marked by piles of stones, following as nearly as possible the track of a mountain-torrent which came roaring down in cascades from the melting snows above. At a height of about 9,000 feet the snow became deeper; the roaring of the torrent was hushed to a perfect stillness; and we entered a gray canopy of clouds which hid everything from sight, except the piles of stones which marked the trail. For two hours or more we climbed slowly upward enveloped in clouds, hearing nothing but the crunching of snow under our horses' feet, until at last a cold, piercing wind began to blow suddenly in our faces. We had reached the summit, 11,000 feet above the sea, and the wind came from the other side of the range. The clouds by which we were still enveloped hid everything from sight, except the ground on which we stood; and the intense cold made it impossible to stay on the summit. But there were signs of a clearing-up; and we were very anxious to get a view, if possible, from that elevated standpoint, of the valleys of Kahetia and Georgia, which lay under our feet.

We had our reward. Just as we were about to begin our descent, the gray ocean of vapor, as if smitten by the mantle of Elijah, suddenly opened beneath us; and there, 11,000 feet below, like a sunken Atlantis, lay the broad, sunny valley of Georgia, — a huge colored map framed in clouds. Scores of glittering streams, like shining silver threads, lay stretched through the broad expanse of meadow-land which sloped away from the foot of the mountain. Orchards, vineyards, and olive-groves diversified it here and there with patches of darker green; and far away in the distance appeared the purple, snow-clad mountains of Armenia. The contrast between the scenery on the north side of the range and that on the south side was remarkable. Behind us rose the barren, jagged peaks of

the snowy range, the white teeth of winter ; before us was the green, fertile valley of Georgia, smiling under a summer sun ; — on the north, Siberia ; on the south, Italy ; and we standing knee-deep in snow on the summit, shivering in the keen, piercing wind of a northern winter. The view was a grand one, but we were soon forced by cold to begin the descent. At two o'clock in the afternoon we were wading through snow on the summit, 11,000 feet above the sea ; at nine o'clock in the evening we were riding through dark olive-groves, and vineyards redolent with the odor of ripening grapes, listening to the monotonous croaking of frogs, and inhaling the warm, fragrant atmosphere of a night in June. In seven hours we had passed from midwinter to midsummer ; and the mountains of the great range rose in cold, white, apparently inaccessible peaks far above our heads.

VII.

THE RUINS TO BE FOUND IN NEW MEXICO, AND THE EXPLORATIONS OF FRANCISCO VASQUEZ DE CORONADO IN SEARCH OF THE SEVEN CITIES OF CIBOLA.

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Brigadier-General, U. S. A.

READ DECEMBER 23D, 1878.

MR. PRESIDENT, LADIES, AND GENTLEMEN, — The early history of our continent cannot but be interesting to every lover of his race, and of the Great Architect who doth all things after the counsel of His will, and leadeth the nations of the earth concurrently with His own majestic designs, and the free-will which induces every man to choose his own path, and to mark out his own destiny.

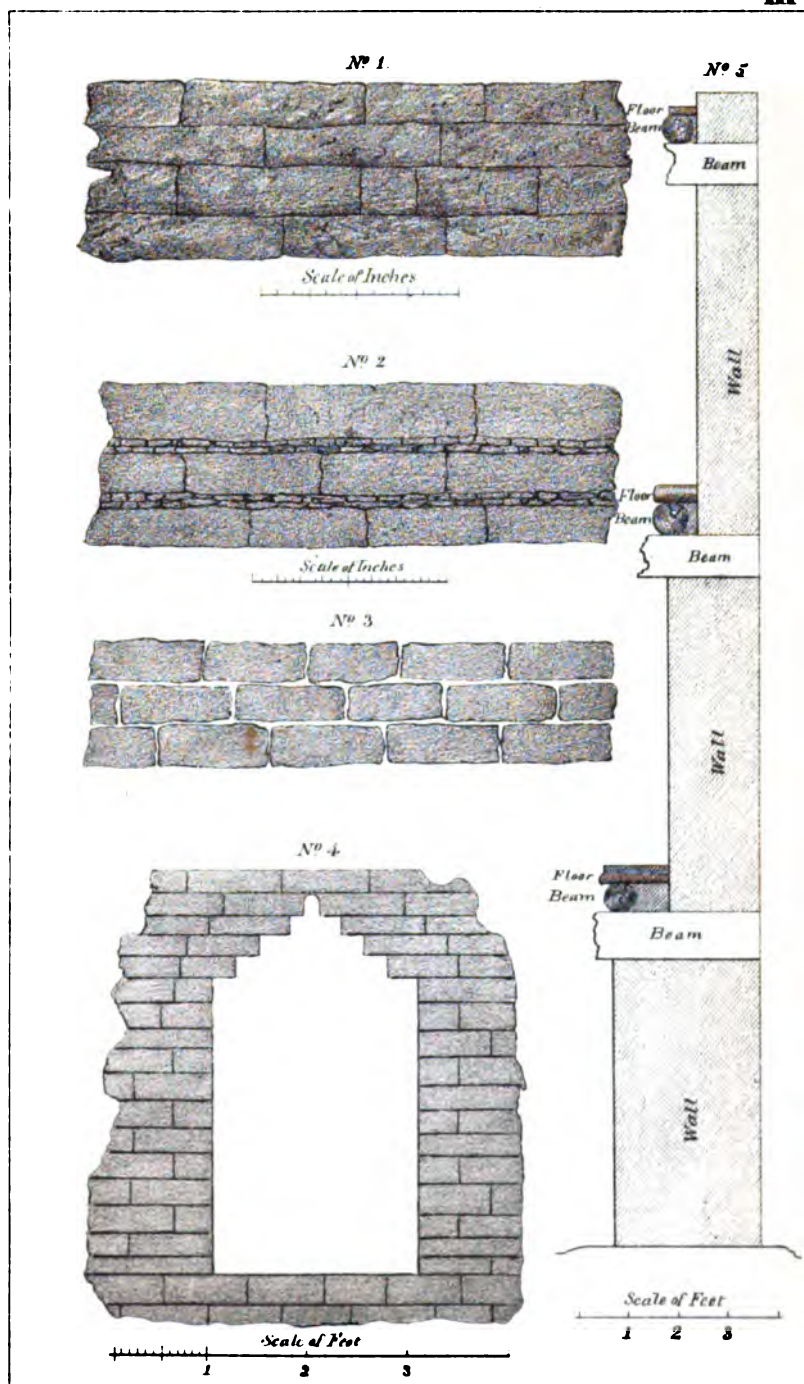
It is probably a very common belief among the masses, that this continent was first inhabited by a civilized people, after Christopher Columbus discovered it, in 1492; but the ruins which at the present day remain, many of which I have myself seen, together with their history, which has come down to us from Spanish explorers as early as the middle of the sixteenth century, attest with unerring certainty that this continent had been previously inhabited by a people who were so advanced in civilization that they lived in organized communities, cultivated the soil, and inhabited cities or villages, the houses of which were made of stone, planned in the most methodical manner, and built with a precision and in such magnitude as to challenge, even now, the admiration of the modern explorer, and to eclipse in style and durability those of the present day, which are the achievement of the Spaniards and Mexicans of more recent times. With regard to the mounds and other evidences of a



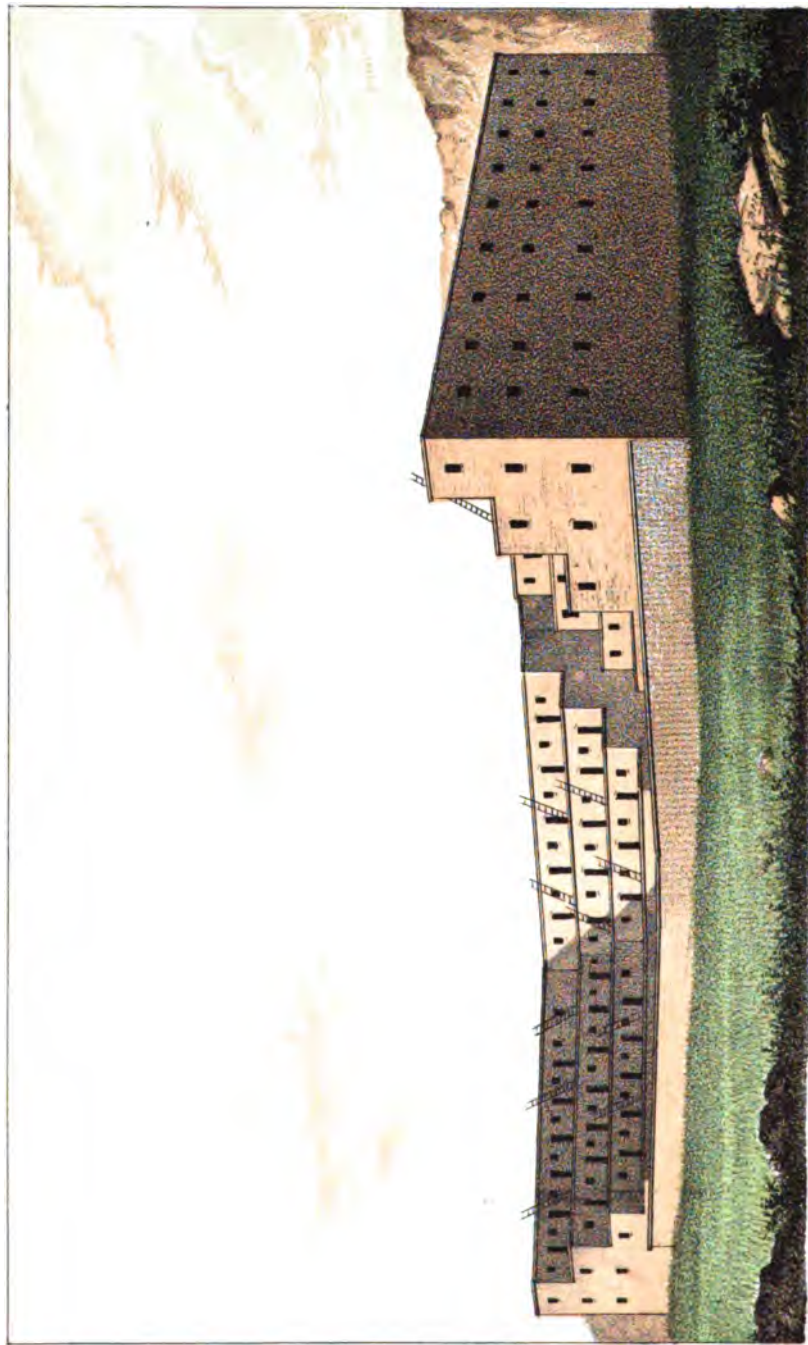
NORTH WEST VIEW OF THE RUINS OF THE PUEBLO PINTADO IN THE VALLEY OF THE RIO CHACO.

people long passed away, and which have been found throughout our land, on the east side of the Rocky Mountains, I am not aware that they are of such a character as to show that the originators of them were anything else than barbarians, or at least a race that had made but little progress in the arts of civilized life. Such an inference, however just in reference to the *tumuli* aborigines of this country, would be very unfair in reference to the builders and denizens of the immense stone and regularly constructed edifices, which are at the present time to be found in the ruins of New and old Mexico and in Central America. In the fall of 1849, I was military engineer to a body of troops which was commanded by the late Colonel John M. Washington, U. S. A., then Governor of New Mexico, and which made an expedition into the country occupied by the Navajoes, lying some 200 miles to the south-west from Santa Fé. In the course of our march, after crossing the Sierra de los Mimbres, or, as it is laid down on some maps, the Sierra Madre (the high convex lands dividing the tributaries of the Gulf of Mexico from those of the Pacific), we came to the Rio Chaco, a small tributary of the Rio San Juan, which is itself a tributary of the Colorado of the West. Learning from our guide, a Spaniard by name (Carravahal), that on this tributary there were some ruins of edifices of an origin unknown to the Indians among whom they were situate, I obtained leave from my commanding officer; and, with Carravahal as guide and seven Mexicans as an escort, with Mr. Richard M. Kern, who had been with Fremont, as my artist, I absented myself two days from the command in search and examination of these ruins. We first came to a ruin called, by the Pueblo Indians of the present day, the Pueblo of Montezuma; by the Mexicans, the Pueblo Colorado; by Hosta, an Indian (the Alcalde of Zemas), the Pueblo de Ratones; by Sandoval, a friendly Navajo chief, Pueblo Grande; and by Carravahal, our guide, Pueblo Pintado. Here was a structure, with its walls still standing, in places in its integrity, as many as four stories high, which had been built of tabular pieces of a hard, fine-grained, compact, gray sandstone (a material entirely unknown in the present architecture of New Mexico), to which the atmosphere had imparted a reddish tinge, and on which account it was doubtless called Pueblo Colorado, and also Pueblo Pintado. The several courses of stone on the exterior faces of the walls were not more than three inches thick, the intervals between being chinked with laminar stones of the minutest thinness, the whole presenting, at a little distance, the appearance of a magnificent piece of mosaic

work. The filling and backing were done in rubble masonry, the mortar showing no indications of the presence of lime, but appearing to be the ordinary earth of the country. The thickness of the main wall at its base was about three feet; at the second story it was less, diminishing every story by retreating jogs from the inside. Its elevation at its then highest point was between twenty-five and thirty feet; the series of floors indicating there must have been originally at least four stories. I found no signs of the genuine arch about the building. The lintels of the doors and windows were pieces of wood, sometimes laid horizontally side by side; others, a single stone slab laid in this manner, and occasionally a series of smaller stones, so placed horizontally upon each other, that, while presenting the form of an acute angle in elevation, they would support the weight of the fabric above. The ground-plan of the building, including the court, in exterior development, was about 400 feet. On the ground-floor, exclusive of the outbuildings, were fifty-four apartments, some of them as small as five feet square; and the largest about twelve by six feet. The rooms communicated with one another by very small openings, some of them as contracted as two and one-half feet square. The principal rooms, or those most in use, were, most probably, those of the upper stories, the larger windows indicating this; though nothing could be definitely determined, on account of the partitions between the rooms no longer existing. The system of flooring seems to have been unhewn beams, six inches in diameter, laid transversely from wall to wall, and then a number of smaller ones, about three inches in diameter, laid across them. What was placed on these did not appear, but most probably it was brush, bark, or slabs, covered with a layer of earth mortar. The beams showed no signs of the saw, but seemed to have been hacked off by some imperfect instrument. At different points about the premises were three circular apartments, sunken in the ground, the walls being of masonry. These apartments, the Pueblo Indians call *estufas*, or places where the people held their political and religious meetings. The site of the ruins was a knoll, some twenty or thirty feet above the surrounding plain. Fragments of pottery, in large quantities, lay strewed around, the colors still very bright, and showing taste in the selection and in the style of their arrangement. The bed of the River Chaco, now an *arroyo*, or dried-up river, passed by it, two or three hundred yards distant, and no wood or grass was visible in the vicinity. Hosta, the Pueblo Indian from Hemez, of which he was the Alcalde, who



MASONRY OF THE CHACO AND OTHER RUINS.



SUPPOSED APPEARANCE OF THE PUEBLO, HUNDES PAVIE, IN ITS INTEGRITY.

was accompanying the troops, said this *pueblo* had been built by Montezuma and his people, when they were on their way from the north to the south; that, after living here awhile, they dispersed; some going east and settling on the Rio Grande, and others south into old Mexico. About twelve miles farther down the valley or cañon of the Chaco, we came to another ruined structure, called, by our guide, Pueblo Wege-gi. The walls of this building, like the *pueblo* I have before described, were composed of very thin tabular pieces of compact sandstone. The circuit of the structure, including the interior court, was about 700 feet. The number of apartments on the ground-floor, judging from what were distinguishable, must have been about 100. The highest existing elevation of the exterior walls was about twenty-five feet, the great mass of fallen débris at the base showing it must have been originally higher. Two other *pueblos* were visited, one of which (the Hungo Pavie) showed, at the time I saw it, a height of about thirty feet. The ends of the floor-beams, still remaining in the walls, showed there had been, originally, at least four stories of apartments, and the débris at the base being very great, it is reasonable to infer that there had been even more. As usual, the ground about the premises was strewn with broken pottery in large quantities.

Continuing down the cañon about two miles, we came to a fifth extensive structure in ruins, the name of which our guide called Pueblo Chetho Kette, or, as he interpreted, Rain Pueblo. These ruins had an extent of exterior circuit of about 1,300 feet. The material and style of the masonry were the same as those already described, the beams cedar and pine. The number of stories discoverable was four, there having been originally a series of windows, four and a half by three feet, in the first story, which were then walled up. The number of rooms on the first floor, all of which were distinguishable, excepting those in the west wing, must have been as many as 124. The *estufas*, of which there were six, had a greater depth than those we had seen before, and differed in having more stories. In the north-west angle of the ruins we found a room in an almost perfect state of preservation. It was fourteen by seven and one-half feet in plan, and ten in elevation. It had an outside door-way three and one-half by two and one-quarter feet, and one at its west end, two and one-half by two feet, leading into an adjoining room. The stone walls still had their plaster on them in a tolerable state of preservation. There were several niches in the walls of the room. The ceiling showed two main beams, laid transversely; on these

crosswise were a number of small ones, the ends of which were tied together by a species of wooden fibre, and the interstices chinked in with small stones; on these again, transversely, in close contact, was a kind of lathing, of the odor and appearance of cedar, — all in a good state of preservation.

Four hundred yards down the cañon, we came to a sixth *pueblo* in ruins, called Pueblo Bonito. This *pueblo*, although not so beautiful in the arrangement of the details of its masonry as Pueblo Pintado, was yet superior to it in point of preservation. The circuit of its walls was about 1,300 feet. This structure showed at least four stories. The number of rooms on the ground-floor, at the time discoverable, was 139, and these did not include those not distinguishable in the eastern portion of the *pueblo*, which would probably swell the number to about 200. There having been then at least four stories, and supposing the horizontal of the edifice to have been uniform from bottom to top, or, in other words, not of a retreating terrace-form on the court-side, it is not unreasonable to infer that the original number of rooms was as many as 800. But, as most probably the building was terraced at every story, there must be a reduction from this number of one range of rooms for every story after the first, and this would lessen the number to 641. The number of *estrufas* was four; the largest, sixty feet in diameter. Among the ruins were several rooms in a very good state of preservation — one of them being walled up with alternate beds of large and small stones, the regularity of the combination producing a very pleasing effect. The ceiling of this room was more beautiful than any we had seen, — the transverse beams being smaller and more numerous, and the longitudinal pieces resting upon them only about an inch in diameter and very regular.

A few hundred yards further down the cañon, we fell in with another *pueblo* in ruins, called Pueblo del Arroyo, the circuit of which was about 100 feet. About a quarter of a mile further, we came to another small ruined edifice; and half a mile further, still another, — the style of structure the same as the others we had seen. Two miles further down the cañon, we came to still another *pueblo* in ruins, called Pueblo de Penasca Blanca, the circuit of which I found, by pacing the distance, to be as many as 1,700 feet. This was the largest edifice we had seen, and differed from the others in the arrangement of the stones composing its walls.

A very remarkable circumstance, which I must mention, is the fact that these ruins are situate in a region which at the present

time is a perfect desert, not so much as a blade of grass being visible, and no water; this indicating that the country must have undergone a very great change, and it is probable that this change was the cause of the ruins' abandonment. I saw other ruins during the expedition; but none so remarkable, in the extent of their plans, or showing so much of the inclosing walls standing. One of these ruined *pueblos* I saw in the renowned cañon of the Chelly, about 135 miles west from those of the Chaco, a portion of them being situate on a shelf, under an overhanging rock, some fifty feet above the bottom of the cañon, and so steep that not one of my party was enabled to reach them. Evidently their occupants must have used ladders for the purpose. A number again I saw in the valley of the Rio de Zuni, or, as it is sometimes called, the Little Colorado, which is a tributary to the big Colorado of the West. These ruins lie scattered to the eastward of the present inhabited Pueblo of Zuni, along a distance of sixteen miles. Still another I saw perched some 250 feet high, on an almost inaccessible rock, which I have called "Inscription Rock," on account of the large number of inscriptions I found on it, and to which I will again allude.

Now, of the origin of these ruins the Indians, among whom they are situate, know nothing. They evidently, however, must have been built in ages remote, by a people far superior to the present race of Indians; and, without going into a discussion of the subject, which the limits of this lecture will not permit, I will state that Humboldt locates the first resting-place of the Aztecs, in their migration from north to south, about in the latitude and longitude of the ruins of the cañon of Chaco, already described. His language, in his essay on New Spain, is, "The Indian traditions inform us that some twenty leagues to the north of Moqui, near the embouchure of the river Zepiannes, a river of the Navajoes, was the first resting-place (*demeure*) of the Aztecs after their sortie from Atzlan." Again, on his map accompanying his essay, he gives the date of this sortie as 1160, but says the tradition is uncertain.

I have described these ruins for the purpose of introducing another subject, the early explorations of this country by the Spaniards, — a subject which I have examined with considerable research, on account of a writer in the *North-American Review* of April, 1869, Mr. Lewis H. Morgan, giving it as his opinion that these ruins in the cañon of the Chaco are the remains of the seven lost cities of Cibola, which Coronado, with a large army, went in search of from

the City of Mexico, in the years 1540 and 1542. I cannot agree with this writer in this opinion, but am firmly of the belief that the seven lost cities were along the Little Colorado; or, as it is sometimes called, Rio de Zúñi, and to which I will refer in the sequel.

In the year 1530, Nuño de Guzman, President of New Spain, was informed by his slave, an Indian from the province of Tejos, situated somewhere north from Mexico, that in his travels he had seen cities so large that he might compare them with the City of Mexico; that these cities were seven in number, and had streets which were exclusively occupied by workers in gold and silver; that to reach them a journey of forty days, through a desert, was required; and that travellers penetrated the interior of that region by directing their steps northwardly (speaking very indefinitely, in the language of the times) between the two seas,—referring to what was in that day called the North Sea, meaning the Gulf of Mexico, and the South Sea, meaning the Pacific Ocean. Nuño de Guzman, confidently relying on this information, organized an army of 400 Spaniards and 20,000 Indian allies of New Spain, and set out in search of these seven wonderful cities; but, after reaching the province of Culiacan, on the Pacific coast, he encountered such great difficulties, on account of the mountains he had to cross, that he abandoned the enterprise, and contented himself with colonizing the province of Culiacan. In the meantime, the Tejos Indian, who had been his guide, dying, the seven cities remained only known by name until about eight years after, when there arrived in Mexico three Spaniards, named Alva Nuñez Cabeça de Vaca, Andres Dorantes, and Alonso del Castillo Maldonado, accompanied by a negro named Estevanico (Stephen). The history of these persons, as described by one of them, Cabeça de Vaca, was so remarkable that I must give a brief account of it. They belonged to an expedition under Pamphilo de Narvaez, which sailed from the West Indies early in 1528, with 400 men, eighty horses, and four ships, for the purpose of exploring the country of Florida, of which Narvaez had been made Governor, and which then comprised, indefinitely, the country lying to the north of the Gulf of Mexico. Narvaez reached the harbor of Santa Cruz (supposed to have been Tampa Bay, on the Gulf or west coast of Florida) in April of that year, and, on the 1st of May, debarked with 300 men, forty of whom were mounted, for the purpose of exploring the interior of the country. His instructions were, that the vessels should coast along the shore, so as to be in easy communication with the land-forces. On the 20th

of June, he reached an Indian town called Appalache (probably Appalachicola), where he tarried twenty-five days. He then journeyed, in nine days, to a place called Ante. Continuing his course thence westwardly for several days, his men became so dispirited from finding no gold, and from the rough treatment of the natives, that they returned to Ante, where, hearing nothing of the ships which had been ordered to be in easy communication with them, they constructed five small boats, in which 250 of the party, all who had not died or been killed by the natives, embarked, steering along the coast, westwardly, for Panuco, lying on the coast of Mexico. While making their way with great difficulty, they encountered a severe gale, in which all the boats were capsized, except that of the Governor Narvaez, which drifted out to sea, and all on board perished, or were never afterwards heard of. Those of the party belonging to the other boats that were not drowned swam to an island, which they called Malhado (Misfortune), where, and on the main-land adjacent, they remained for six years enslaved to the Indians, who treated them with the greatest barbarity. From this cause, and from starvation and cold, the greater portion of them died. At length four of them, those I have before mentioned, escaped from their bondage, taking in their flight a northern course towards the mountains (probably those of Northern Alabama), and thence, westwardly, across a great river coming from the north (doubtless the Mississippi) to the head-waters of the Canadian, which they seem to have crossed just above the great cañon; and thence, south-westwardly, through what is now New Mexico and Arizona, to Culiacan, on the Pacific coast, and thence the City of Mexico.

The tales these adventurers told were quite marvellous. They stated to the then Viceroy of the kingdom, Don Antonio de Mendoza, that they had carefully observed the country through which they had passed, and had been informed of great and powerful cities, called "The Seven Cities of Cibola," in which were houses several stories high and terraced. The Viceroy communicating this information to the new governor of the province of New Galicia, Francisco Vasquez de Coronado, the latter set out for Culiacan, taking with him three Franciscan friars, one of whom, by name Marcos de Niza, in the language of the chronicler Castaneda, was theologian and priest. As soon as he reached Culiacan he despatched the three Franciscans, with the negro Estevanico, before mentioned, on a journey of discovery, with orders to return and report to him all they could ascertain by personal observation of the seven cele-

brated cities. The monks not being pleased with the negro's company, sent him, in advance, to pacify the Indians through whose country he had previously passed, and to prepare the way for the successful prosecution of their journey. The negro, it appears, reached Cibola, but on account of his insolence he was killed by its inhabitants. The effect of this was to frighten those of Marcos de Niça's party that had accompanied him, and to cause them to retrace their journey homeward. Meeting on their way the monks before mentioned, they told them all that had occurred; and they, in their turn, becoming frightened, retreated in haste to Culiacan. Arriving there, they reported the results of their attempted journey to Coronado, and gave him such a glowing description of all the negro had discovered, and of what the Indians had told them, as well as of the "islands filled with treasure", which they were assured existed in the Southern Sea (quoting from Castañeda's Relations), that he departed immediately for the city of Mexico, taking with him Friar Marcos de Niça, in order that he might narrate all that he had seen to the Viceroy. It is also said, that he magnified the importance of the discovery by disclosing it only to his nearest friends, and pledging them to secrecy. Arrived in the city of Mexico, he had an interview with the Viceroy Mendoza, and proclaimed everywhere that he had found "the seven cities" searched for by Nuño de Guzman, and busied himself with preparing an expedition for their conquest. Friar Marcos de Niça having been made, through the influence of the monks, the provincial of the Franciscans, the pulpits of the country resounded with the marvels of discoveries, to such an extent, that, in a few days, 300 Spaniards and 800 Indians were assembled for the enterprise. Among the Spaniards, as the chronicler relates, there were a great many gentlemen of good family, and probably there never had been an expedition in which there was such a large proportion of persons of noble birth. Francisco Vasquez de Coronado, the Governor of New Galicia, was proclaimed captain-general, because he was the author of the discovery; and the Viceroy Mendoza did all he could to foster the enterprise. The place of rendezvous was Compostella, the capital of New Galicia, 110 leagues from the city of Mexico; and the time, Shrove-Tuesday, in the year 1540.

The Viceroy Mendoza also organized at the same time a naval expedition to coast along the Southern Sea (the Pacific Ocean), and to coöperate with the army in its search of "the seven cities". He gave the command of this expedition to Don Pedro d'Alarcon,

whose orders were to embark from La Natividad, and, with two vessels, to go to Jalisco, to transport the supplies which the soldiers could not carry. After performing that duty, he was to follow the march of the army along the coast, and to go north as far as the thirty-sixth degree of latitude, with instructions to make frequent debarkations, and to join the army in that latitude. All these dispositions having been made, the Viceroy departed for Compostella, the place of rendezvous for the army, with a large body of gentlefolks. Everywhere he was received with great *éclat*. He reviewed the troops, by whom he had been received with great rejoicing, and, the next day, after mass, harangued them. He told them of their duties, and of the advantageous result that this conquest would produce, not only in their fortunes, but in the conversion of the nations they would vanquish; and His Majesty, on his side, promised them his bounty and additional favors. Finally the Viceroy caused every one to be sworn, on a missal containing the Holy Evangels, not to abandon their general, and to obey all his commands. The next day, the army, with banners flying, took up the line of march. For two days the Viceroy accompanied it, and then returned to the city of Mexico. No sooner, however, had the Viceroy left the army than it began to experience all the hardships incident to a wild, mountainous country. The baggage had to be transported on horses; and, as many soldiers had never been accustomed to load them, they made sorry work of it. The consequence was, that a great deal of their baggage, as in modern enterprises of a like character, had to be abandoned; and, in order to get along at all, many a gentleman, as Castañeda states, had to become a muleteer; and they who shirked from this necessary labor were regarded by their companions as lacking spirit.

Coronado, arriving at Chiametla with his army, met at that point Captains Melchior Diaz and Juan de Saldibar, who, with a dozen resolute men, by Coronado's orders, had explored the country so far as Chichilticale, which is on the border of the desert, and 200 leagues from Culiacan. These officers gave, in secret, such a doleful account of the country they had passed through, that, it leaking out, many in the army began to lose heart; and it was only by Friar Marcos de Niça insisting upon it that the country was a good one, and that they should not leave it with empty hands, that they were persuaded to continue the march. The day after Easter, the army took up its march under Coronado for Culiacan, at which place they were well received by the citizens, and furnished with all necessary

supplies. This was the last town inhabited by Spaniards, and, therefore, the last from which they could gather provisions, except from the Indians with whom they might meet in their further march. It is represented by the chronicler Castañeda as having been 210 leagues from the city of Mexico. After resting a couple of weeks at Culiacan, Coronado led the advance of his army, consisting of fifty cavaliers, and a few infantry (his particular friends), and gave orders for the balance to march two weeks after, and to follow his route. Castañeda describes his progress as follows:

"When the general had passed through all the inhabited region to Chichilticale, where the desert begins, and saw that there was nothing good, he could not repress his sadness, notwithstanding the marvels which were promised further on. No one, save the Indians who accompanied the negro, had seen them, and already on many occasions they had been caught in lies. He was especially afflicted to find this Chichilticale, of which so much had been boasted, to be a single ruined and roofless house, which at one time seemed to have been fortified. It was easy to see that this house, which was built of red earth, was the work of civilized people who had come from afar.

"On quitting this place, they entered the desert. At the end of fifteen days, they came within eight leagues of Cibola, on the banks of a river which they named Vermejo, in consequence of its red and troubled water. Mullets resembling those of Spain were found in it. It was there that the first Indians of the country were discovered; but when these saw the Spaniards they fled and gave the alarm. During the night of the succeeding day, when not more than two leagues from the village, some Indians, who were concealed, suddenly uttered such piercing cries that our soldiers became alarmed. Notwithstanding, they pretended not to regard it as a surprise; and there were even some who saddled their horses the wrong way, but these were men who belonged to the new levies. The best warriors mounted their horses and scoured the country. The Indians, who knew the land, escaped easily, and not one of them was taken.

"On the following day, in good order, they entered the inhabited country. Cibola was the first village they discovered. On beholding it the army broke forth with maledictions on Friar Marcos de Niza. God grant that he may feel none of them!"

To continue Castañeda's relation:

"Cibola is built on a rock. This village is so small, that, in truth, there are many farms in New Spain that make a better appearance. It may contain 200 warriors. The houses are built in three or four stories; they are small, not spacious, and have no courts, as a single court serves for a whole quarter. The inhabitants of the province were united there. It is composed of seven towns, some of which are larger and better fortified than Cibola. These Indians, ranged in good order, awaited us at some distance from the village. They were very

loath to accept peace; when they were required to do so by our interpreters, they menaced us by their gestures. Shouting a war-cry of 'Sant'Iago,' we charged upon and quickly caused them to fly.

"Nevertheless, it was necessary to get possession of Cibola, which was no easy achievement, for the road leading to it was both narrow and winding. The general was knocked down by the blow of a stone as he mounted in the assault; and he would have been slain, had it not been for Garci Lopez de Cardenas and Hernando d'Alvarado, who threw themselves before him, and received the blows of the stones which were designed for him and fell in large numbers; nevertheless, as it is impossible to resist the first impetuous charge of Spaniards, the village was gained in less than an hour. It was found filled with provisions which were much needed, and in a short time the whole province was forced to accept peace."

The main army, which had been left at Ouliacan under the command of Don Tristan d'Arellano, followed Coronado as directed by him, every one marching on foot, with lance in hand and carrying supplies. All the horses were laden. Slowly and with much fatigue, after establishing and colonizing Sonora, and endeavoring to find the vessels under Alarcon already referred to, by descending the river, in which they failed, the army reached Cibola. Here they found quarters prepared for them, and rejoiced in the reunion of the troops, with the exception of certain captains and soldiers who had been detached on explorations.

Meantime Capt. Melchior Diaz, who had been left at Sonora, placed himself at the head of twenty-five choice men, and, under the lead of guides, directed his steps towards the south-west, in hopes of discovering the coasts. His course was probably down Rio Sonora; and, not finding the vessels there, he doubtless marched northward, keeping as close to the coast as the rivers would permit. After travelling about 150 leagues, it appears he arrived in a country in which there was a large river, called Rio del Tizon (Firebrand), whose mouth was two leagues wide. This river, I will here remark, was the Colorado of the West. Here the captain learned that the vessels under Alarcon had been seen on the sea-coast, at a distance of three days' journey from that place. In the language of Castañeda: "When he reached the spot that was indicated, and which was on the banks of the river, more than fifteen leagues from its mouth, he found a tree on which was written 'Alarcon has come thus far; there are letters at the foot of this tree'." They dug and found the letters, which apprised them that Alarcon, after having waited a certain length of time at that spot, had returned to New Spain, and could not advance farther because that sea was a gulf;

that it turned around the Isle of the Marquis, which had been called the Isle of California; and that California was not an island, but a part of land forming the gulf.

It appears, that, after a good deal of difficulty, and a threatened attack from the natives, the party crossed the Rio del Tizon, on rafts, some five or six days' travel higher up, and continued its journey along the coast. Quoting from Castañeda: "When the explorers had crossed the Rio del Tizon, they continued following the coast, which at that place turns towards the south-east, for this gulf penetrates the land directly towards the north, and the stream flows exactly towards the mouth, from north to south." No better description could be given of the relative position of the Gulf of California, with respect to the Rio Colorado flowing into it from the north, than the foregoing.

This expedition was terminated by the death of Melchior Diaz, which occurred in a very singular manner, as follows: One day a greyhound, belonging to a soldier, attacked some sheep which the Spaniards were driving with them to serve as food in case of need, when Capt. Melchior Diaz threw his lance at the beast, in order to drive him off. Unfortunately the weapon struck in the ground, with the point uppermost; and as Diaz could not rein in his horse, which was at a gallop, quickly enough, it pierced his thigh through and through, and mortally wounded him. The soldiers at once decided to retrace their steps, taking their wounded chief with them. The Indians, who were always in rebellion, did not cease attacking them. The captain lived about twenty days, during which he was borne along with the utmost difficulty. When, at length, he died, all his troops returned in good array (to Sonora), without the loss of a single man, after traversing the most dangerous places.

In this connection it may be interesting to give some account of Alarcon's discovery of the Rio Colorado. It will be recollected that he was ordered, by the Viceroy Mendoza, to follow the march of the army, with his vessels, along the coast of the Southern Sea, as the Pacific Ocean was then called. From his report to the Viceroy, I gather the following:

On the 9th of May, 1540, Fernando Alarcon put to sea from La Natividad, in command of two ships, the "Saint Peter" and the "Saint Catharine." He put into the ports of Xalisco and Agnaival (respectively the ports of Compostella and Culiacan), and, finding Coronado and his army gone from this last-mentioned place, he continued his course northwardly along the coast, taking with him

the ship "Gabriel," which he found there laden with supplies for the army. At length, arriving towards the upper end of what was till then believed to be a strait, separating an island from the mainland, but which he discovered to be a gulf (the Gulf of California), he experienced great difficulty in navigating, even with his small boats; and there were some in the expedition, he remarked, who lost heart and were anxious to return, as did Capt. Francisco de Ulloa, with his vessels, in a former voyage of discovery. Alarcon, it seems, however, had the necessary pluck; and, agreeably to the orders of the Viceroy Mendoza, he was determined to make his explorations as thorough as possible. After incredible hardships, he managed to get his vessels to the bottom, or northern end, of the gulf. Here he found a very great river, the current of which was so rapid that they could scarcely stem it. Taking two shallops, and leaving the others with the ships, and providing himself with some guns of small calibre, on the 26th of August, 1540, he commenced the ascent of the river by hauling the boats with ropes. On his way he met a large number of Indians, who made signs to him to return down the river; but by good management he so appeased them that he was enabled to reach a distance above the mouth of the river, such that in two and a half days on his return to the ships, on account of the swiftness of the current, he made the same distance he had in fifteen and a half days in ascending the river. On this expedition, he learned from the Indians he had met some particulars of the death of the negro Stephen, before referred to, at Cibola, and of there being white persons like themselves at that place, who, doubtless, belonged to Coronado's army. Alarcon was, however, unable to communicate with the army on account of the desert intervening between them, and the great distance they were apart. Refitting all his shallops, this time, for a second voyage up the river, he left its mouth on the 14th of September, but was no more successful in this than in his former expedition in communicating with Coronado. Having, therefore, reached as far up the river as he thought expedient, he planted a cross at that point, and deposited at its foot some letters, in the hope that some persons of Coronado's army, searching for news of the vessels, might find them. These letters, it has already been stated, were found by Melchior Diaz, on the Rio del Tizon, called by Alarcon the "Bon Guide", after the device of his lordship Don Antonio de Mendoza, and at the present day, the Rio Colorado.

At the end of Alarcon's relation to the Viceroy, he reports that

he found the latitude, as given by the "patrons and pilots of the Marquis del Valle", wrong by two degrees; that he had gone further by four degrees than they; and that he had ascended the river a distance of eighty-five leagues. This report of Alarcon's is very interesting, from its great particularity and the many incidents it gives of the expedition. It shows, also, that he was fully equal to the trust committed to him, and that no explorer could have done more to carry out the orders of the Viceroy Mendoza.

We will now return to the army under Coronado at Cibola. This general immediately set to work to explore the adjacent country. Hearing there was a province in which there were seven towns similar to those of Cibola, he despatched hither Don Pedro de Tobar, with seventeen horsemen, three or four soldiers, and Friar Juan de Padilla, a Franciscan, who had been a soldier in his youth, to explore it. The rumor had spread among its inhabitants, that Cibola was captured by a very ferocious race of people who bestrode horses that devoured men, and, as they knew nothing of horses, this information filled them with the greatest consternation. They, however, made some show of resistance to the invaders in their approach to their towns; but the Spaniards charging upon them with vigor, many were killed, when the remainder fled to the houses and sued for peace, offering, as an inducement, presents of cotton stuff, tanned hides, flour, pine-nuts, maize, native fowls, and some turquoises.

These people informing the Spaniards of a great river on which there were Indians living, who were very tall, a report of the same on his return to Cibola was made by Don Pedro de Tobar to Coronado, who sent out another party, consisting of twelve men, under Don Garci Lopez de Cardenas, to explore this river. It appears, from Castañeda's Relations, that the party passed through Tusayan again on their way to the river, and obtained from the inhabitants the necessary supplies and guides. After a journey of twenty days through a desert, it seems they reached the river, whose banks were so high, that, as Castañeda expresses it, "they thought themselves elevated three or four leagues in the air." For three days they marched along the banks of the river, hoping always to find a downward path to the water, which from their elevation did not seem more than a yard in width, but which, according to the Indians' account, was more than half a league broad. But their efforts to descend were all made in vain. Two or three days afterwards, having approached a place where the descent appeared practicable, the

captain, Melgosa Juan Galeras, and a soldier, who were the lightest men in the party, resolved to make the attempt. They descended until those who remained above lost sight of them. They returned in the afternoon, declaring that they had encountered so many difficulties that they could not reach the bottom; for what appeared easy when beheld from aloft was by no means so when approached. They added that they had accomplished about one-third of the descent, and that thence the river already seemed very wide, which confirmed what the Indians had stated. Galeras and the soldier also averred that some rocks which had been seen from on high, and had not appeared to be scarcely so tall as a man, were, in truth, loftier than the tower of the Cathedral of Seville.

Castañeda, after describing the further progress of the exploring party, goes on to say: "The river was the Tizon (Colorado). A spot was reached much nearer its source than the crossing of Melchior Diaz and his people (before referred to), and it was afterwards known that the Indians who have been spoken of were the same nation that Diaz had seen." The Spaniards retraced their steps to Cibola, and this branch-expedition had no other result.

I have thus briefly described the explorations which were made by Coronado and his captains as far as Cibola, on the northern edge of the great desert northward of Chichilticale; the branch expedition of Melchior Diaz from Sonora northward to and around the head of the Gulf of California, after crossing the Tizon (Colorado), in search of the vessels; the exploration of the river Tizon, by Alarcon, in boats, for a distance of eighty-five Spanish leagues, or about 290 miles above its mouth; the expedition of Don Pedro de Tobar from Cibola to Tusayan, lying to the north-west of Cibola twenty-five leagues; and the exploration of Don Garci Lopez de Cardenas from Cibola through Tusayan, westwardly to the deeply cañoned river Tizon, or Colorado. I shall now give, in as few words as I can, some account of Coronado's subsequent explorations to the eastward of Cibola.

While the discoveries above mentioned were being made, some Indians living seventy leagues towards the east, in a province called Cicuyé, arrived at Cibola. There was with them a Cacique, surnamed Bigotes (Mustaches), on account of his wearing these long appendages. They had heard of the Spaniards, and had come to offer their services and their friendship. They offered gifts of tanned skins, shields, and helmets, which the general reciprocated by giving them necklaces of glass beads, and bells, which they had

never before beheld. They informed him of cows, because one of these Indians had one painted on his body. Castañeda goes on to say, "But we would never have guessed it from seeing the skins of these animals, for they are covered with a frizzled hair which resembles wool"; thus showing that they certainly were buffaloes. The general ordered Capt. Hernando d'Alvarado to take twenty men and to accompany these Indians, but to return in eighty days, to render an account of what he might have seen. Alvarado departed with them; and, five days after, they arrived at a village named Acuco, built on a rock. The inhabitants, who were able to send about 200 warriors into the field, were the most formidable brigands in the province. This village was very strongly posted, inasmuch as it was reached by only one path, and was built upon a rock, precipitous on all its other sides, and at such a height that the ball from an arquebuse could scarcely reach its summit. It was entered by a stairway, cut by the hand of man, which began at the bottom of the declivitous rock, and led up to the village. This stairway was of suitable width for the first 200 steps, but after these there were 100 more much narrower; and when the top was finally to be reached, it was necessary to scramble up the three last toises by placing the feet in holes scraped in the rocks. As the ascender could scarcely make the point of his toe enter them, he was forced to cling to the precipice with his hands. On the summit there was a great arsenal of huge stones, which the defenders, without exposing themselves, could roll down on their assailants; so that no army, no matter what its strength might be, could force this passage. There was on the top a sufficient space of ground on which to cultivate and store a large supply of corn, as well as cisterns to contain water and snow. The Indians here, as at Tusayan, traced lines on the ground, and forbade the Spaniards to pass over them; but, seeing the latter disposed for an attack, they quickly sued for peace, and presented to their conquerors a supply of birds, bread, tanned deer-skins, pine-nuts, seeds, flour, and corn. Three days' journey thence, Capt. Alvarado and party reached a province called Tiguex, where, on account of Bigotes, whom the inhabitants knew, they were received very kindly; and the captain was so well pleased with what he saw that he sent a messenger to Coronado, inviting him to winter in that country, which pleased the general greatly, as it made him believe that his affairs were growing better. Five days' journey thence, Alvarado reached Cieny , a village very strongly fortified, and whose houses have four stories. He reposed here with his party some days, when he fell in with an

Indian slave who was a native of the country described as adjacent to Florida, the interior of which, as the chronicler states, Fernando de Soto had lately explored. This Indian, whom they called *El Turco* (the Turk), on account of his resemblance to the people of that nation, spoke of certain large towns, and of large stores of gold and silver in his country, and also of the country of the bisons (buffaloes). Alvarado took him as a guide to the bison country; and, after he had seen a few of the quadrupeds in question, he returned to Tiguex to give an account of the news to Coronado.

In the order of events, Coronado, who had remained at Cibola with the main body of the army, hearing of a province composed of eight towns, took with him thirty of the most hardy of his men, and set out to visit them on his way to Tiguex. In eight or eleven days (the narrative is here obscure), he reached this province, called Tutahaco, which appears to have been situated on the Rio de Tiguex, below the city of Tiguex, for Castañeda expressly states that he afterwards ascended the river and visited the whole province until he arrived at Tiguex. The eight villages composing this province were, not like those of Cibola, built of stone, but of earth. He also learned of other villages still farther down the river.

"On his arrival at Tiguex, Coronado found Hernando d'Alvarado with the Turk, and was not a little pleased with the news they gave him. This Indian told him that in his country there was a river two leagues wide, in which fish as large as horses were found; that there were canoes with twenty oarsmen on each side, which were also propelled by sails; that the lords of the land were seated in their sterns upon a dais, while a large golden eagle was affixed to their prows. He added, that the sovereign of this region took his siesta beneath a huge tree, to whose branches golden bells were hung, which were rung by the agitation of the summer breeze. He declared, moreover, that the commonest vessels were of sculptured silver; that the bowls, plates, and dishes were of gold. He called gold *acochis*. He was believed because he spoke with great assurance, and because, when some trinkets of copper were shown him, he smelt them and said they were not gold. He knew gold and silver very well, and made no account of the other metals. The general sent Hernando d'Alvarado to Cicuyé to reclaim the golden bracelets which the Turk pretended had been taken from him when he was made prisoner. When Alvarado arrived there, the inhabitants received him kindly, as they had done before; but they positively affirmed that they had no knowledge of the bracelets, and they assured him that the Turk was a great liar, and had deceived him. Alvarado seeing there was nothing else he could do, lured the chief, Bigotes, and the Cacique under his tent, and caused them to be chained. The inhabitants on this account reproached the captain with being a man without faith or friendship, and launched a shower of arrows on him. Alvarado, however, conducted these prisoners to Tiguex, where the general retained them more than six months."

This affair seems to have been the beginning of Coronado's troubles with the Indians, which were subsequently increased by his exacting of a large quantity of clothing, which he divided among his soldiers.

Two weeks after Coronado left Cibola for Tiguex, agreeably to his orders, the army, under the command of Don Tristan d'Arellano, took up its march from that place for Tiguex. The first day it reached the handsomest and largest village in the province, where it lodged. "There they [the army] found houses of seven stories, which were seen nowhere else. These belonged to private individuals, and served as fortresses. They rise," in the language of the chronicler, "so far above the others that they have the appearance of towers. There are embrasures and loopholes from which lances may be thrown, and the place defended. As all these villages have no streets, all the roofs are flat, and common for all the inhabitants; it is therefore necessary to take possession, first of all, of those large houses which serve as defences."

The army passed near the great rock of Acuco, already described, where it was well received by the inhabitants of the city perched on the house-tops. Finally it reached Tiguex, where it was also welcomed and lodged. The good news given by the Turk cast the soldiers' past fatigues into oblivion, although the whole province was found in open revolt; and not without cause; for, on the preceding day, the Spaniards had burned a village: and we have already seen that the imprisonment of Bigotes and the Turk, and the exactions of clothing by Coronado, had also very greatly exasperated them. The result of all this was, that the Indians had generally revolted, as they said, on account of the bad faith of the Spaniards, and the latter retaliated by burning some of their villages, killing a large number of the natives, and at last laying siege to and capturing Tiguex. This siege lasted fifty days, and was terminated at the close of 1540.

After the siege, the general despatched a captain to Chia, which had sent in its submission. It was a large and populous village, four leagues west of the Tiguex River. Six other Spaniards went to Quirix, a province composed of seven villages. All these villages were at length tranquillized by the assiduous efforts of the Spaniards to regain the confidence which they had justly lost by their repeated breaches of faith; but no assurances that could be given to the twelve villages in the province of Tiguex would induce them to return to their homes, so long as the Spaniards remained in the country; and no wonder, for no more barbarous treachery was ever

shown to a submissive foe, than had been shown to these Tigueans by these faithless Spaniards.

So soon as the Tiguex River (Rio Grande), which had been frozen for four months, was sufficiently free from ice, the army took up its march, on the 5th of May, 1541, to Quivira, in search of the gold and silver which the Turk had said could be found there. Its route was via Cicuyé, twenty-five leagues distant. The fourth day after leaving Cicuyé, and crossing some mountains, it reached a large and very deep river, which passed pretty near to Cicuyé, and was, therefore, called the Rio de Cicuyé. Here it was delayed four days to build a bridge. Ten days after, on its march, the army discovered some tents of tanned buffalo-skins, inhabited by Indians, who were like Arabs, and who were called Querechaos. Continuing its march in a north-eastwardly direction, it soon came to a village in which Cabeça de Vaca and Dorantes (mentioned in the first part of this paper) had passed through on their way from Florida to Mexico. The army met with, and killed, an incredible number of buffalo; and after reaching a point 250 leagues (850 miles) from Tiguex, the provisions giving out, Coronado, with thirty horsemen and six foot soldiers, continued his march in search of Quivira, while the rest of the army returned to Tiguex, under the command of Don Tristan d'Arellano. The narrative goes on to say:

“The guides conducted the general to Cuivira in forty-eight days, for they had travelled too much in the direction of Florida. At Cuivira they found neither gold nor silver; and, learning from the Turk that he had, at the instance of the people of Cicuyé, purposely decoyed the army far into the plains to kill the horses, and thus make the men helpless and fall an easy prey to the natives, and that all that he had said about the great quantity of silver and gold to be found there was false, they strangled him. The Indians of this region, so far from having large quantities of gold and silver, did not even know these metals. The cacique wore on his breast a copper plate, of which he made a great parade, which he would not have done had he known anything about those precious metals. The army, as stated above, retreated to Tiguex before reaching Quivira. They took as guides some Teyans, through whose country they were passing, and were led back by a much more direct way than they had pursued in coming. These Teyans were a nomadic nation, and, being constantly in the pursuit of game, knew the country perfectly. It is narrated they guided the army thus: every morning they watched to note where the sun rose, and directed their way by shooting an arrow in advance, and then before reaching this arrow they discharged another. In this way they marked the whole of their route to the spot where water was to be found, and where they encamped. The army consumed only twenty-five days on the journey, and even then much time was lost; the first time it had taken thirty-seven days.”

On the road, a great number of salt-marshes, where there was a considerable quantity of salt, were passed. Pieces longer than tables, and four or five inches thick, were seen floating on the surface. On the plains they found an immense number of small animals (squirrels), and numerous holes burrowed by them in the earth. These animals were most unquestionably the little prairie-dogs, whose villages have been so naively described by Washington Irving and George Wilkins Kendall. On this march, the army reached the River Cicuyé, more than thirty leagues below the place where it had before crossed the stream by a bridge. It then ascended the river, by following the banks, to the town of Cicuyé. The guides declared that this river, the Cicuyé (no doubt the Pecos), at a distance of more than twenty days' journey, threw itself into that of Tiguex (the Rio Grande), and that subsequently it flowed towards the east. Castañeda goes on to say: "It is believed that it (the Tiguex) joins the great river of Espiritu Santo (Mississippi River), that the party of Hernando de Soto discovered in Florida."

The army under Arellano reaching Tiguex, on its return from the prairies, in the month of July, 1541, this officer immediately ordered Capt. Francisco de Banio Nuevo to ascend the Rio de Tiguex (Rio Grande), in another direction, with some soldiers, on an exploring expedition. It reached the provinces, one of which comprising seven villages, was called Hernes; the other, Yuqueyunque. Twenty leagues (sixty-eight miles) further, in ascending the River, the party came to a large and powerful village, named Braba, to which the Spaniards gave the new title of Valladolid. It was built on the two banks of the river, which was crossed by bridges built with nicely squared timber. The country was very high and cold. From Braba the explorers returned to Tiguex. Another party, it seems, went down the Rio de Tiguex (Rio Grande) eight leagues, where they discovered four large villages, and reached a place where the river plunged beneath the ground; but, inasmuch as their orders confined them to a distance of eighty leagues, they did not push on to the place where, according to the Indians' accounts, this stream escapes again from the earth with considerably augmented volume.

We shall now return to Coronado, whom we left at Quivira. It appears, that, in consequence of his not arriving at Tiguex at the expected time, Don Tristan d'Arellano set out in search of him, with forty horsemen. At Cicuyé the inhabitants attacked Don Tristan, by which attack he was delayed four days. Hearing of the

approach of Coronado, he contented himself with guarding the passes in the vicinity of the village, till the arrival of the general. Castañeda says that, "notwithstanding he had good guides, and was not encumbered with baggage, Coronado was forty days in making the journey from Quivira." From Cicuyé he journeyed to Tiguex, where he went into winter-quarters, with the intention, in the spring, of pursuing his discoveries by pushing his whole army towards Quivira.

"When winter was over, Coronado ordered the preparation to be made for the march to Quivira. Every one then began to make his arrangements. Nevertheless, as often happens in the Indies [to use the language of the chronicler], things did not turn out as people intended, but as God pleased. One day of festival, the general [Coronado] went forth on horseback, as was his custom, to run at the ring with Don Pedro Maldonado. He was mounted on an excellent horse; but his valets having changed the girth of his saddle, and having taken a rotten one, it broke in mid-course, and the rider unfortunately fell near Don Pedro, whose horse was in full career, and, in springing over his body, kicked him in the head, thus inflicting an injury which kept him a long while in-doors, and placed him within two fingers of death."

The result of this was that Coronado, being of a superstitious nature, and having been foretold by a certain mathematician of Salamanca, who was his friend, that he should one day find himself the omnipotent lord of a distant country, but that he should have a fall which would cause his death, he was very anxious to hasten home to die near his wife and children. From this time, Castañeda states, Coronado, feigning to be more ill than he was, worked upon his soldiery in so subtle a way as to induce the greater part of them to petition him to return to New Spain. They then began openly to declare their belief that it was better to return, inasmuch as no rich country had been found, and it was not populous enough to distribute it among the army. The general, finding no-one to oppose him, took up his line of march on his return to Mexico in the beginning of April, 1542. He returned by the way of Cibola and Chichilticale, as he had come. At length, after skirmishing with the Indians, in which a number of their men and horses were killed, the army reached Culiacan. From this place Coronado departed for the city of Mexico, to make his report to the Viceroy, only about 100 of his army continuing with him. Castañeda says he was badly received by the Viceroy, who, nevertheless, gave him a discharge; yet he lost his reputation, and, soon after, his government of New Galacia also.

Thus ended this great expedition, which for extent in distance travelled, duration in time (extending from the spring of 1540 to the summer of 1542, or more than two years), and the multiplicity of its coöperating branch-explorations, equalled, if it did not excel, any land-expedition that has been undertaken in modern times.

VIII.

THE INDIAN TERRITORY AND ITS INHABITANTS.

BY COLONEL E. C. BOUDINOT.

READ DECEMBER 23D, 1873.

MR. PRESIDENT, LADIES, AND GENTLEMEN,—The Indian Territory, where the principal civilized Indian tribes are located, is bounded on the north by the State of Kansas, on the south by Texas, on the east by Missouri and Arkansas, and on the west by Texas and the Territory of New Mexico. It contains about 70,000 square miles, or a larger area than the six New England States combined. In agricultural advantages and delightful climate, it is unsurpassed by any section of the country of equal extent; the south half of it is excellent for cotton, while corn and wheat and the best of fruits are produced in all its settled portions. It rivals Texas as a stock-country, and is much superior to Kansas in this respect. Coal, iron, lead, zinc, copper, and salt, and petroleum springs, abound throughout the Territory. The coal is bituminous and lignite, and is of a very superior quality. None but surface-measures have as yet been developed; these, at the Kansas line, are found eighteen inches in thickness. They increase as you travel south, until, near the southern boundary of the Territory, they are six feet thick. The principal tribes occupying this country are the Cherokees, in the north; the Creeks and Seminoles, in the middle; and the Choctaws and Chickasaws in the south. They are known as the five civilized tribes. All of them, except the Seminoles, have a written constitution and code of laws. These Indians have traditions that about 400 years ago they occupied extensive territory

in the north-western part of Mexico. They probably belonged to the Aztec empire. After the fall of Montezuma, they moved in a body across the continent to the shores of the Atlantic, being fifteen years on the journey, and fighting and conquering all the hostile tribes that opposed them. They adopted the vanquished, while many of the weaker tribes sought their alliance for protection. Remnants of the Uchees, Alabamas, fire-worshipping Natchez, and of other once powerful tribes, may be seen to-day among the Cherokees and Creeks. None of these obliterated tribes, so far as I have learned, except the Natchez, have any tradition that they formerly lived in Mexico. The traditions of these civilized tribes are fast fading away. Formerly a perfect system was observed in transmitting and perpetuating them. These civilized tribes number in the aggregate about 50,000 souls, divided, as nearly as can be ascertained from present data, as follows: Whites, who have become members of the tribes by marriage or adoption, 5,000; negroes, formerly slaves of the Indian, but now, with the single exception of the Choctaws, incorporated as citizens of the tribes, 10,000; leaving but 35,000 Indians, properly so called. Of these, one-half can speak the English language. Besides the civilized Indians, the savage tribes of Arapahoes, Kiowas, Cheyennes, Comanches, Osages, and a number of smaller tribes, numbering altogether 20,000, have been assigned reservations in this Indian Territory.

Nearly all of these wild Indians have a language peculiar to their individual tribes; yet they all speak the Comanche tongue, which seems to be considered by them as the correct language of the plains. The Choctaws and Chickasaws occupy a very desirable portion of the Indian Territory, bordering on Red River; they descended from a people called the Chickamicaws, who, according to tradition, were among the first inhabitants of the Mexican empire. These tribes speak the same language, and are no doubt the same people; though, as far back as any definite history can be obtained concerning them, they have maintained a separate tribal existence. The Chickasaws were an aggressive and warlike people; while the Choctaws, though defending their country with desperate valor, rarely made war for conquest. It is a singular fact, that although, a century ago, the Choctaws could not swim, the Chickasaws excelled in that art, and took especial pains to teach it to their children. The Choctaws and Chickasaws, in the time of De Soto, numbered 50,000 warriors; they number at the present day 20,000

souls, all told. The Choctaws, 15,000 strong, occupy a reservation of 6,688,000 acres in the south-east corner of the Territory; the Chickasaws, 5,000 in number, own a reservation of 4,377,600 acres, lying west of the Choctaw Nation. Though each tribe has its separate legislature and civil government, neither can make any disposition of its lands without the consent of the other; a Chickasaw has the same right in the Choctaw Nation that a Choctaw has, and *vice versa*. All the nations and tribes in the Indian Territory hold their lands in common, but there is a growing sentiment among them in favor of owning land in severalty. The Chickasaws have the honor of making the first movement as a nation towards this reform in the Indian policy. In their legislature of last fall, they adopted a memorial praying the government of the United States to allot them their lands in severalty, which have already been surveyed and sectionized. The Choctaws and Chickasaws are the only Indians that have abandoned the savage titles of chief and council; their chief magistrates are governors, and their legislative bodies legislatures. There are four high schools and forty-eight neighborhood day-schools in these nations; the Choctaws sustaining thirty-six of these at a cost of \$86,500, and the Chickasaws sixteen, at a cost of \$33,000. The Chickasaws send a number of their youth of both sexes to some of the best schools in the States at the public expense, making the total amount expended for purposes of education more than \$50,000. There is a strong sentiment among the leading men of these tribes in favor of coming into the Union as a state. The Creek and Seminole nations lie immediately north of the Choctaw and Chickasaw reservations: they speak the same language, and are in reality the same people. A portion of the Muscogee Nation seceded many years ago, and established themselves in Florida, and ever since have maintained a separate nationality. These seceders were, by the Muscogees, called Seminoles, which signifies "runaways". The Creeks, or Muscogees, number 18,000, and the Seminoles 2,300. The Muscogees were called Creeks by the English, because of the numerous small streams abounding in their country in Georgia. According to a tradition of the Creeks, they came from Asia. Crossing the Pacific, they landed near the Isthmus of Darien; from thence to the north of Mexico; and afterwards to their country upon the Atlantic shores, subduing the Alabamas, Uchees, and many other warlike tribes that ventured to oppose them. Whenever the Creeks decided to go to war in olden time, their principal chief caused to be displayed in the public

places a club, part of which was painted red; hence the name "Red Sticks", given to the hostile Creeks in the wars with them. Within the memory of Indians now living, the Creeks, numbering, as I have said, 13,000 souls, occupied an extensive territory in Georgia and Alabama; and, although at that time about 50,000 strong, they were considered a mere remnant of a once mighty nation. There is in the Creek Nation a class of Indians called Uchees. These were formerly a distinct and powerful tribe, until subjugated by the Creeks and incorporated in their nation. They were doubtless the original inhabitants of an extensive country near the Atlantic coast, in the vicinity of the present city of Savannah. Unlike the Alabamas, Natchez, and other tribes whose names and languages have been merged in the Muscogee and Cherokee, the Uchees still retain their name and language; they have no tradition of ever having migrated from West to East.

The Creeks, but a few years ago, showed a marvellous respect for the decrees of their judicial tribunals. When a person was arraigned for an offence punishable with death, he was given a fair and impartial trial. If found guilty, he was sentenced to be shot at a certain state of the sun five days from that time. He was then dismissed, and he returned to his home, unaccompanied by any guard whatever. He passed the time, as usual, among his neighbors; but punctually at the fatal hour he appeared voluntarily at the place of execution to die. There was no thought of escape, no writ of error, or motion for a new trial. To evade his sentence or be behind time on the fatal day was considered infamous. It must be confessed, however, that this nice sense of honor and respect for the law among the Creeks has been impaired by their advancement in civilization.

My own nation, the Cherokee, completes the list of what are known as the principal civilized tribes. We number at present, according to the official report for this year, of the Commissioner of Indian Affairs, about 15,000; but this includes about 1,500 negroes, 500 whites, and 1,500 Shawnees, Delawares, and other Indians who have become a part of the Cherokee Nation. We have some forty public free schools and two high schools. The buildings of the latter cost \$80,000 each. The Cherokees once had extensive settlements on the Appomattox River in Virginia, and formed the principal tribe in the Powhatan Confederation. That chief was a Cherokee. They are the only Southern Indians who count as high as one hundred by numeral names. All other Indians count only to ten; after that, they

add units, as ten-one, ten-two, etc. The Cherokee calls twenty-twos, while the Creek calls it ten-twos. Among the Cherokees, as well as among all the Southern Indians, there is a class of men called conjurors, who are held in the highest estimation by the common people. They profess miraculous powers. In times of disastrous droughts the Creek conjuror still exercises his mysterious incantations to produce rain, and generally succeeds in producing it, by continuing his ceremonies until the clouds are propitious. But the honorable profession in olden times had its embarrassments and responsibilities; for should the conjuror fail to produce rain after a fair trial, he was put to death as an impostor; and should he bring too much rain, he shared the same fate. Cities of refuge, similar to those of the Jews, were recognized sixty years ago among the Cherokees. Within their sacred limits no blood could be shed. "The beloved man," or man of wisdom and peace, was absolute ruler therein. Even an enemy at war, if found within the peaceful boundaries, was entertained with the greatest hospitality and dismissed without harm. The Cherokee language seems to be distinct and independent of all other Indian tongues; it is smooth and soft, and when spoken, by females especially, sounds most musical. There are but two words in the language which require the touching of the lips to pronounce, those two words mean *water* and *salt*, and have the sound of the English letter M. The Cherokees are the only Indians who have an original alphabet for their language. The Creeks and Choctaws use the English characters; but the Cherokees have an alphabet of their own, invented by a Cherokee who could not talk the English language. His name was Sequoyah. This inventive genius — the Cadmus of his race — had none of the lights of science or civilization to guide him; but, conceiving the idea of enabling the Indian to talk on paper, as he one day saw the agent of the United States doing, he shut himself up in his cabin for more than a year, and endured, like many other reformers and inventors, the jibes and jeers of the ignorant and thoughtless, who all pronounced him crazy, until he came forth with a perfect alphabet, and established his claim to be ranked among the first inventive minds of the century. He traced the characters of his alphabet on chips and pieces of bark. This alphabet was invented in 1822; it consists of seventy-eight characters, and, strange to say, is most easily learned by children. Soon after the Cherokee alphabet was perfected, type was procured and a newspaper established called the *Cherokee Phoenix*. My father

was the first editor of that paper. One-half was published in the Cherokee language, and the rest in English. After the Cherokees became settled in their present homes the paper was continued, under the name of the *Cherokee Advocate*, and is still printed in the Cherokee and English languages, so that it may reach all classes of the people. It is now edited by my brother, William P. Boudinot.

In the north-east corner of the Indian Territory are situated the remnants of those once powerful and warlike tribes, the Senecas and Shawnees. Most of the latter are of the Cherokee Nation, but some still have a separate reservation east of the Cherokees. The Modocs have also been recently removed to this part of the Indian Territory. One great error in the legislation of this country with reference to the Indians, for the past forty years, has been that no discrimination has been made between the civilized and the savage. The Cherokee or Choctaw Indian who graduates from your best colleges studies a profession, and takes respectable rank among your ministers, doctors, and lawyers, is still, in the contemplation of your laws, just as much of a savage as the warrior of Red Cloud's band whose Alma Mater are the bow and scalping-knife.

The first law of the country to regulate trade and intercourse with the Indian tribes was enacted in 1790. At that time no Indian tribe approached civilization, and the law was uniform and proper. But since then the Cherokees, Creeks, and Seminoles, Choctaws and Chickasaws, have become civilized. More than a generation has passed away since they exchanged the bow for the plough, and their superstitions and traditions for the Bible and school-book. Yet, while they have emerged from the darkness of barbarism to the light of civilization, no one could discover it from the character of your laws. It would be out of place for me on this occasion to discuss the Indian question; but, in connection with the statements I have submitted concerning the civilized Indian of the Indian Territory, I venture to give very briefly my own ideas of the proper policy to be pursued in relation to them. These are: The passage by Congress of a Territorial bill for the Indian country which will provide for a survey and sectionizing of the Territory; the establishment of United States courts; a delegate to Congress, and all the necessary officers of a strong civil local government for the protection of life and property, which will declare, at least all the civilized Indians, citizens of the United States, authorize the selection by them of 160 acres of land for every man, woman, and child; the same to be inalienable for a term of years; the lands remain-

ing unappropriated to be sold by the United States government to actual settlers at not less than \$1.25 per acre, and the funds accruing to be invested for the benefit of the Indians,—the interest of which should be used in great part, if not entirely, as an educational fund. But the plan to organize a civil government over the civilized Indian tribes, though solemnly agreed to in the latest treaties which have been made with them, is denounced by some as a job, and as being in the interest of railroad corporations. Certain railways have grants of land through this Indian Territory conditioned on the extinguishment of the Indian title; and it is loudly proclaimed that the organization of a civil government by Congress will extinguish the Indian title. I have prepared a bill which is now before the appropriate committee of Congress in strict conformity to the treaty, for the establishment of a Territorial government over the Indian Territory, in which I have endeavored to obviate this objection. The seventeenth section of this bill reads as follows: "That nothing in this act shall be construed as extinguishing, or affecting in the slightest degree, the Indian title to any of the lands of any of the nations or tribes within the said Territory of Oklahoma; nor shall anything in this act be construed as impairing or interfering with the rights, privileges, or jurisdiction of the tribal governments within said Territory." The tax-gatherer is sent to the civilized Indian tribes by the authority of your Congress and your courts to levy tribute for the support of this great country, in spite of the solemn treaty which stipulated it should not be done. Is it not right and just, then, that we should have some voice in your government when you compel us to contribute to its support? Then make us citizens of the United States, clothe us with the prerogatives of such, arm us with the power and rights of American citizens. Depend upon it, the civilized Indian will bless you, if he but understands that he is elevated from the degrading rank of a ward and subject to the proud position of American manhood and citizenship. You struck the shackles from the limbs of four million slaves, and, while still dazzled by the full blaze of liberty, you girded them with the armor of American citizenship, and bade them protect their new-born rights. You transformed the ignorant slave into an American citizen. Be as just and generous to the civilized Indian. His title in common is insecure. Give him a better one in severalty. He is subject to your laws and to your courts. Give him a voice in making the laws which are to govern him, and the right to sit upon a jury which is to try his own countrymen. He

is subject to your revenue laws, and pays taxes to the support of your government. Give him that representation which should go hand-in-hand with taxation. Give the Indian those equal rights before the law which are conceded to all other people. Arm him with the powers and privileges of an American citizen. Give him that title to his land which he can protect and defend. Then, and not till then, will he have a country which he can call his own; then will he be possessed of land which is his indefeasible property; then will he have a home where he can rest his weary feet with no dark forebodings of the future.

IX.

CAUSES OF MILD TEMPERATURE, &C., OF OUR INTERIOR AND WESTERLY NORTHERN LATITUDES.

BY GEN. W. MILNOR ROBERTS.

COMMUNICATED.

No single cause, perhaps, can be designated that will account for the meteorological phenomena already known in connection with the extreme northern latitudes of the United States. The fact is well established, that there are zones of country between latitudes 45° and 49° north in which the climate is materially milder, and the snow-fall much less, than in more southern latitudes. This, of course, is contrary to the general impression, that the farther north, the greater the cold and the deeper the snow. It is equally clear that there are sufficient reasons for the apparent anomaly. Does our present knowledge enable us to define these? Of one fact we may feel assured, that there has been no perceptible or essential change in the climatic characteristics of the region under consideration since the days of Lewis and Clarke, the great original explorers of the general route now soon to be traversed by the modern railroad. They were not looking for, or thinking of, railroad routes, for their admirable continental exploration was effected more than twenty years prior to the railroad advent, in the very beginning of the present century. Their graphic accounts still remain accurately descriptive of the extensive range of country traversed between the waters of the Missouri and the Pacific Ocean, and show that the very same peculiar climatic characteristics now observed, existed in 1804-5, nearly seventy years ago.

Since the time of Lewis and Clarke, meteorology has become more of a science, and numerous observations on land and sea have been collated, and now form the basis of our present knowledge of the air and water currents of this region. Besides, the love of gold, and the calculated fanaticism of Joe. Smith's Mormon leaders, carried thousands of people into the interior of the Rocky-Mountain regions

which otherwise might have continued to be *terra incognita* for a long period in the future ; so that for some years the Pacific slope, from San Francisco to the northern boundary, latitude 49° , separating the United States from British Columbia, has had an influx of intelligent population from the Eastern States, some of them observers.

The isothermal lines, or lines of equal temperature, instead of passing directly west along the parallels of latitude, incline northward, far up into the valleys of British Columbia. These isothermal lines are more real than the lines of latitude. What are the causes of the northerly trend of these curves of equal temperature ? We ascribe them to several primary causes : First, the flow of the comparatively warm currents of the Pacific Ocean eastward striking upon the coast, passing both north-eastward and southward, warming the air, and ameliorating the climate of the lands bordering on the Pacific ; second, the flow of the comparatively warm air from the Pacific Ocean, passing landward, and raising the temperature that might otherwise be due to latitudes 45° to 49° north ; third, the existence of the two great nearly parallel ranges of mountains,—the Cascade range, within about one hundred miles of the Pacific Ocean, and the main range of the Rocky Mountains, and its vast spurs, about eight hundred miles east of the same coast ; fourth, the fact that the passes or depressions of the Rocky Mountains to the northward become lower, by more than two thousand feet, thus allowing the warm upper winds from the Pacific, or portions thereof, after flowing over the comparatively dry and treeless plains of the great Columbia valley, to pass through to the valleys along the headwaters of the Missouri, thus ameliorating to some extent their climates. There may be other causes, arising from the general topography of the interior ; but this article is not intended to be exhaustive ; is not designed to cover all the various auxiliary causes, which hereafter may be better known than they are now.

What are the general consequences of the operation of the causes we have just described ? Among them are—first, a peculiar and remarkable climate west of the Cascade range of mountains, somewhat resembling a tropical climate, giving about five months of comparatively mild, rainy weather, and about seven months of warm weather, comparatively devoid of rain, with very little snow in winter in the valleys, and only light freezing weather after the middle of January. The winters are usually so short and so mild, that sometimes they cannot get ice for their ice-houses ; and flowers which would be killed on the Atlantic coast in the latitude of

Philadelphia or Baltimore remain out all winter uninjured along the Lower Columbia and around Puget Sound, between latitudes 46° and 48° north. Were it not for the tempering heat from the warm waters, and the warm air of the Pacific Ocean, such phenomena could not occur. Second, the Coast or Olympic range, west of Puget Sound, and the Cascade range, eastward of the Sound, already mentioned, lie almost parallel with the coast-line, and lift their ragged summits to the height of 5,000 to 8,000 feet, the loftier peaks being still more elevated; Mount Rainier, in Washington Territory, having a height of 12,330 feet. The general range of elevation may be about 7,000 feet; the passes being only from 3,000 to 4,000 feet high. These ranges are the condensers, — the first set of condensers landward from the coast. They condense the moist, warm atmosphere from the ocean, and in winter they accumulate immense masses of snow; while the summits of the higher peaks, and for several thousands of feet down, are perpetually snow-clad. The Columbia River cuts through the Cascade Mountains, and a portion (comparatively limited, of course) of the lowest stratum of the warm, moist air from the Pacific passes inward; but the bulk of the moisture in the lower atmosphere, perhaps to the height of 5,000 or 6,000 feet above the sea, is precipitated on the cool slopes of this mountain-range, and returned during the spring and summer to the ocean by the rivers flowing into the Columbia, etc., and into Puget Sound. The warm, though less moist, stratum of air from the ocean, ranging above the general level of the Cascade Mountains, passes on, high above the treeless Columbia plains, till it impinges against the immense westerly spurs of the Rocky Mountains, when another precipitation takes place. The Bitter-Root Mountains, the most westerly prong in this latitude (45° to 47°), are not quite so high as the main range, although they are from 6,000 to 8,000 feet or more above the sea, but with some passes as low as 5,000 feet.

Clarke's Fork of the Columbia cuts through this great Bitter-Root range; and here, in the valley of Clarke's Fork, and around the Cœur d'Alène and Pend d'Oreille lakes (Lake Pend d'Oreille, like the Tappan Zee on the Hudson, is in fact an enlargement of Clarke's Fork of Columbia River, which flows through it), as well as on the slopes of the mountains, we again find a splendid growth of timber, after an interval of several hundred miles of almost treeless, grassy plains; these plains rarely receiving much snow, and having, generally, an insufficient quantity of rain.

Following up Clarke's Fork to its various head-waters on the Bitter-Root range, and still farther eastward to its extreme easterly sources in the main range of the Rocky Mountains, the whole plane of the country gradually rises; so that at the actual mountain-base the valleys are from 3,500 to 4,000 feet above the level of the sea.

The Bitter-Root range precipitates very much less snow than the Cascade range, but more than is precipitated farther eastward on the main range; while the quantity of snow in the adjacent valleys is usually quite moderate; so that, following eastwardly along the valleys of the Columbia River and its tributaries to their sources, the depth of snow in the valleys is nowhere very great; while on the mountains, on both sides of the valleys, it may be several feet deep. Some of the passes of the main range are less than 6,000 feet above the sea, and the depth of snow on the summits of these very rarely exceeds eighteen inches; while on the passes of the Cascade range, which are from two to three thousand feet lower, but so much nearer to the coast, there is a depth of many feet every winter.

Immediately east of the main range of the Rocky Mountains, in these same latitudes (45° to 47° north), — take, for instance, the vicinity of Helena (about latitude $46\frac{1}{2}^{\circ}$), the commercial capital of Montana, which is at the base of the mountains about 4,200 feet above the sea, somewhat elevated above the Missouri River (only fifteen miles distant), — the quantity of rain and snow is quite moderate; and the air, stripped of its moisture by the mountains, is generally dry. Snow sometimes will fall here in the valleys to the depth of a few inches, and then, without leaving much, or perhaps any, visible moisture on the ground, evaporate, and disappear in a few hours. Although it is well known, that, as a rule, cold air descends and warm air rises, yet occasionally, when partial vacuums are formed by the sudden condensation of air by cold, the warm air, even from above, rushes in to fill them. In Montana, they call these warm rushing airs "chinook winds".

Without undertaking to offer at present a scientific rationale of the origin, formation, or precise movement of these peculiar winds, further than above, we may state that their effect is certainly very important; for, after the middle of January, the early spring climate of this part of Montana, in latitude $46\frac{1}{2}^{\circ}$ north, at an elevation of over 4,000 feet above the sea, on the eastern foot-hills of the Rocky Mountains, is milder than in the city of New York; and regular ploughing begins in February. From this portion of Montana, the general plane of the country descends continuously very

gradually eastward, along the main valley of the Missouri; and also eastward from the westerly elbow of the Yellowstone to its junction with the Missouri. In all of these valleys, the amount of snowfall and rainfall is never great; the winters, excepting for very brief periods, usually in December, are not very severe; and cattle brouse there and live through ordinary winters without artificial shelter or artificial feeding; although at times, in some years, there come severe cold spells of a few weeks, and peculiar conditions of the air and snow, which render feeding and shelter necessary. The country along the Cascade range, and between the Cascade range and the Pacific Ocean, is probably the greatest timber region on the globe. The unusual moisture, doubtless, is one of the causes; and the soil is very good. Fine timber continues up the slopes of the mountains on both sides, almost to their very summits, on these coast-ranges; while the higher peaks are treeless, and always snow-covered above an elevation of about 8,000 feet. The Bitter-Root range also abounds with fine timber; but it is not equal in quantity, save in certain localities, to the timber along and westward of the Cascade range. The timber on the main range of the Rocky Mountains is not equal in quality or quantity to that on the Bitter-Root range, although in places it is good; while the intervening valleys and slopes everywhere are grass-covered and almost treeless. Indeed, the grass extends generally to the tops of the Rocky Mountains in these latitudes. At the Deer Lodge Pass of the main range, between five and six thousand feet above the sea, the grazing is excellent, and the snow is rarely more than a foot deep. Throughout this region, whether on the hills or in the valleys, cattle thrive even in winter upon the abundant bunch-grass, as it is called.

Passing eastward from the main range, descending either by the Missouri, or by its great confluent the Yellowstone, the pine-forests, at first plentiful, though not dense, on the adjacent mountains and ridges, gradually thin out; so that down the Missouri, and towards the mouth of the Yellowstone, and below, along the Missouri valley, in the vicinity of Fort McKeen, near Heart River, the country becomes comparatively treeless, having only cottonwood, etc., along the margins of the streams. Throughout all this vast region, for 600 miles or more eastward of the Rocky Mountains, as far eastward as the one hundredth degree of longitude, at the Missouri River, about the latitude $46\frac{1}{2}^{\circ}$ north, the winter climate is milder than it is on the same parallel farther eastward in Dakota or Minnesota.

The passes of the Rocky Mountains in British Columbia decrease in height northward above the boundary of 49° , and the country becomes broken into a succession of parallel ridges having a trend about N. N. W., among which are the sources of the Upper Columbia on the west, and the Saskatchewan on the east. The Upper Columbia River in British Columbia presents a very remarkable course, somewhat resembling, though on a larger scale, the Upper Alleghany River of Western Pennsylvania and New York. It rises nearly as far south as 50° , runs N. N. W. at the foot of and parallel with the western slopes of the Rocky Mountains, for over 150 miles, to about latitude $52^{\circ} 10'$ north; then turns abruptly and runs about 250 miles nearly due south, at the foot of and parallel with the Snow Mountains of British Columbia down to the boundary line of the United States (latitude 49°), and thence on a very sinuous course southerly and westerly through Washington Territory. This peculiar topographical feature of the river shows that the plane of the country at the western base of the Rocky Mountains descends northward, while it is exactly reversed at the eastern base of the Snow Mountains, and descends to the south.

The Snow Mountains constitute a very marked feature in the general topography of this part of British Columbia adjoining the United States. This range begins at or near the boundary, latitude 49° , and continues a little west of north for more than 200 miles. The waters of the Columbia, on its eastern base, as already remarked, and the waters of the Okinagaw on the western base, an important confluent of the Columbia, flow southward to their junction about latitude 48° , longitude 120° , in Washington Territory. The Snow Mountains, from their position and extent, must materially affect the moisture and the temperature of the winds reaching them from the Pacific coast, after these winds have passed the two nearly parallel coast-ranges, which in British Columbia are even more marked and better defined mountains than their prolongation in the United States already referred to: but we have not sufficient meteorological data to speak definitely of the climatic effect of the Snow Mountains. We may, however, infer that the upper stratum of air from the Pacific, after clearing the coast-range, would, in winter, in passing eastward, gradually cool, descend obliquely, and part with its moisture on the mountains in the shape of snow; and that the still higher strata, too elevated to impinge against the Snow Mountains, would continue on, still descending obliquely, till they should strike

the main Rocky-Mountain range, about one hundred miles farther east.

A curious circumstance in the Rocky-Mountain topography of this part of British Columbia (latitude 51° to 53°) is, that, while the passes are lower than those farther south in the United States, the great peaks are reputed to be higher,—higher even than the highest of the Rocky-Mountain peaks in the United States. Thus Mount Hooke and Mount Brown, near the great northerly bend of the Columbia, are called respectively 15,700 and 16,000 feet high. There are great valleys eastward of the Rocky-Mountain range in the Saskatchewan country, such as the Saskatchewan valley, which are not only habitable, but highly advantageous as agricultural regions, especially for grazing and the raising of wheat and other cereals. One great topographical feature of that part of our continent in the United States, ranging between latitude 45° and 48° , and between longitude 92° and 122° , from Lake Superior to Puget Sound (an air-line distance of about 400 miles), is this,—that no mountains intervene between the great plains of little elevation west of Lake Superior and the spurs of the Rocky Mountains. All the way from the lake to the Missouri River, 450 miles, is a succession of gently undulating surfaces. The Missouri valley itself is, of course, a gradually descending plane, beginning in the Rocky Mountains, and ending, through the Mississippi, in the Gulf of Mexico.

The Upper Missouri cuts through to their bases all of the spurs of the Rocky Mountains on the eastern side; while Clarke's Fork of the Columbia cuts through to their bases all of the spurs on the western side; thus presenting gradual river-valley slopes from the main dividing passes of the Rocky Mountains to the Atlantic, (Gulf of Mexico) on the one side, and to the Pacific Ocean on the other. Nowhere else on the continent can similar great valleys, such as the Missouri and the Columbia, be found meeting advantageously at a common point on the main dividing backbone which separates the continental waters flowing east and west to the two oceans. The heads of these main valleys, among the foot-hills of the Rocky-Mountain range, as remarked, are here only from three to four thousand feet above the sea, while the great treeless plains, only four to five hundred miles south (about latitude 40° to 42°), between the Black Hills, immediately west of Cheyenne, and the rim of Salt Lake basin, are elevated more than 6,000 feet above the sea for a distance of over 300 miles east and

west. Here the topography is entirely different from the regions to the north. The most remarkable topographical feature of the country along latitude 40° to 42° are the extensive rolling plains, which include the Great Salt Lake basin and the Humboldt River, having a general elevation ranging from 4,000 to 6,000 feet above the sea, with still more elevated land entirely surrounding them. The Bear River, Weber River, and other considerable streams, rising in spurs of the Rocky Mountains, flow into the Great Salt Lake; but the amount of snowfall and rainfall upon their tributary watershed is only equivalent to the evaporation from the same area; so that the lake maintains, within a few feet of irregular fluctuation, the same general level, and the same saltiness, without having any flow outward. The Humboldt River basin, although on a higher level, is of the same general character, the river ending in lakes having no outlet, while all the snowfall and rainfall is taken up by evaporation. The Green River, a principal tributary of the Colorado, which rises about latitude 43° and longitude 110° , flows southward, cutting across the plains west of the Black Hills, and joins the Grand River about latitude 38° , the two forming the Colorado, which flows southward to the Gulf of California, about latitude 32° and longitude 114° . This is the only stream from the plains that flows to the ocean; but in the fall the Green River contains a comparatively small body of water. Probably the mean annual temperature of the Pacific Ocean, opposite latitude 32° , is but little, if any, warmer than it is off the Bay of San Francisco, owing to the curved flow of the equatorial current impinging against the coast, even farther north than the Strait of Juan de Fuca opposite Puget Sound, thence turning southward along the coast, passing the Bay of San Francisco and merging into the mild temperature of the ocean farther south. The amount of rainfall on the plains between the coast range and the ocean, from latitude 40° southward as far as latitude 32° , near the southern boundary of the United States, is very much less than it is northward of latitude 40° , as far as latitude 46° , near the mouth of the Columbia, and even to 48° north, near the entrance to Puget Sound. There is no snowfall south of latitude 40° along the coast (excepting on the mountain range) while on the high foot-hill plains northward, intervening between the Bay of San Francisco and the Columbia valley, considerable snow falls. The coast-range and its spurs are the condensers; while the warm aqueous atmosphere of the ocean adjacent to and west of them is conveyed eastward, and, when condensed, produces the snow and rain on the foot-hills and mountains. The water thus

condensed affords sustenance to large bodies of timber and strong vegetable growths; while eastward thereof the elevated plains, which are about 6,000 feet above the sea, are treeless and dry, owing, in part, to the want of moisture. Experience has shown that the soil of these high plains, about latitude 38° to 40° , in many places is quite fertile, needing only water for irrigation to render it productive. The summers are, however, very short, the winters very long; and this entire elevated region is too frosty for extensive, general agriculture. Six degrees farther north, in the range of latitude 46° to 47° , along the valleys of the Columbia, the climate is more equable, and, being much more moist, agriculture flourishes.

The Willamette valley, west of the Cascade range (of which Portland, Oregon, is the commercial centre), is one of the side-valleys of the Columbia River basin, comprising an area of 4,000,000 acres, upon which the rainfall is abundant, owing to its proximity to the Pacific Ocean and its position among the mountains.

Another of the meteorological facts of the Pacific coast is, that, while the greatest rainfall in the United States occurs in the vicinity of the Columbia River and the southern portions of Puget Sound, in latitude 46° to 47° north, where the yearly rainfall is 76 inches, the least rainfall occurs on the same coast near our southern boundary, latitude 32° , where the average annual rainfall is only three inches.

The maximum difference of temperature of the lowest stratum of the atmosphere between the ocean-air and the land-air in winter seems to occur at or near the outlet of the Columbia valley; but that may be considered to be in part local, at least during the winter and spring, when the cold, fresh waters in immense volumes, flowing from the melting snow of the interior mountains, meet the warmer waters of the Pacific, causing unusual condensation and dense fogs. We may not yet have sufficient meteorological data on the Pacific coast, and in connection therewith for 800 to 1,000 miles eastward, reaching to the main range of the Rocky Mountains, or the data at command may not yet be sufficiently elaborated, to enable us to generalize definitively respecting the exact movements and effects of the oceanic and land air-currents over this part of our continent. The facts herein glanced at are offered, not as settling any question, but as adjuncts in the further elucidation of this most interesting subject.

It seems probable that by the time the upper volumes of the atmosphere flowing eastward from the Pacific reach the interior of

the continent, especially after having passed the Rocky-Mountain range, they have become divested of a large portion of their moisture and latent and sensible heat. Such cold upper strata are then ready to descend eastward obliquely, until they may meet with other strata of the same temperature; but by the time this can occur, supposing that to be at or not far from longitude 100°, other important elements enter into the question both of temperature and humidity.

The great basin of the Missouri River, lying nearly north-west and south-east, is here encountered. The north and north-west winds engendered by difference of temperature, due in part to difference of latitude, during the fall and early part of winter, flow southward or south-eastward along this great valley, meeting obliquely, and falling in with the elevated westerly winds from over the Rocky Mountains. Or these same westerly winds from the higher atmosphere, which have passed above the Rocky Mountains and become cold, may meet moister and warmer winds passing westward from the great lake region, and immediately cause condensation and snow over the extensive prairies east of the Missouri River. On these prairies, the winds in winter do not generally continue long in one direction. Sometimes they blow strongly from the south, and, when occasionally continued for some days, bring mild weather.

The great atmospheric movements here referred to may to some extent account for the sudden and severe cold sometimes experienced on these plains; although the complete rationale of all this may not yet be understood. The extensive Winnipeg Lake system, lying only about 400 miles north of the region just under consideration, may also materially affect this question. When the air is comparatively warm, and therefore rising from the plains, of necessity colder air rushes in to take its place; but the mere fact of the presence of cold at the meteorological stations on or near the Rocky Mountains, where observations have been made, does not prove that its effect will be sensibly felt near the earth six or eight hundred miles eastward, although at times it will be. The barometrical and thermometrical records collected on these extended areas, when intelligently collated at the Signal Office in connection with the known force and direction of the movements of the lower atmosphere at the different points, afford, however, the means of ascertaining the probable force as well as the course of severe storms some time in advance of their arrival at other given places. The primal causes which induce every movement of the atmosphere must be unvarying; but their combinations, acting sometimes in

unison and at other times in opposition, in whole or in part, lead to all the irregularities in the phenomena which are found over so large a portion of the globe. Probably the range of latitude from 36° to 48° , on the American continent, is subject to greater and more sudden variations of temperature than any other portion of the earth; and this may be traced, we think, chiefly, to its peculiar topography of mountains and plains, lakes and rivers, with reference to the Atlantic Ocean on the east and the Pacific on the west, with a vast territory extending northward to within fifteen degrees of the pole, embracing immense land-areas which are too far from the Atlantic and Pacific oceans to be materially affected, directly, by their ocean-atmospheres. The surface-winds from these northerly regions are always colder than the surface-winds from the south.

Concerning the temperature, or even the movements, of the higher strata of the air, our knowledge, practically, is yet very limited; although by reasoning we obtain some insight into their probable meteorological phenomena based on the permanent primal causes referred to. Future observations, when they can be made, of the movements and effect of the higher strata of the atmosphere in connection with those of the lower strata (which are now daily becoming better understood), it is hoped, may reveal to us valuable scientific data which shall serve to systematize into practical shape the meteorology of the whole continent.

The movements of clouds afford some knowledge of the direction, and in a degree of the velocity, of the different middle strata of the atmosphere, so far as they can now be observed; but above such cloud movements, and in clear weather, our observations of higher strata can only be made from elevated mountain-places, or by means of kite-balloons sent up for the purpose. Since the movements of these elevated bodies of air must in the nature of things affect the lower meteorology with which we are now becoming familiar, it may be well for our scientific observers to urge the employment of the requisite means for obtaining such practical knowledge of them as may be obtainable through the means above indicated or in any way deemed most practicable.

This suggestion is applicable to the Atlantic States as well as to the interior. At present, nearly all our observations of the thermometer, barometer, the direction of the wind, etc., are confined to points near to or at most within a few hundred feet of the earth's surface; while we know, from occasional experience, that at no great elevation the wind may be blowing a contrary course to that observed near the surface.

Clouds are sometimes seen at different elevations moving in three different directions. A knowledge of these upper motions may enable us to obtain more reliable generalizations respecting the probable movements of storms. It is a curious meteorological fact that, while the snow-line on the Pacific coast, in latitude 46° , is only about 8,000 feet above the sea, it is about 12,000 feet at the Rocky Mountains, 800 miles inland from the ocean.

X.

SURVEY OF A PORTION OF THE MEXICAN-GULF COAST.

BY COMMANDER F. H. BAKER, U. S. N.

COMMUNICATED.

NORFOLK, Va., *December 2d*, 1873.

DEAR SIR, — In my letter of the 13th of August last, I promised to write in reference to my recent survey of the Mexican-Gulf coast. Various causes have prevented me from doing so heretofore, but I will now endeavor to give you some account of it. However, as it was only a running survey, to which only a limited time could be allowed, with a most inaccessible coast to deal with, I fear I shall have little of interest to relate for the Society. On the 15th of March last, I left Key West, in command of the United States steamer "Wyoming," for the mouth of the Rio Grande, to commence the survey referred to. The Rio Grande was not reached until the 27th of the same month, owing to heavy south-east gales and a "norther," and to the necessity of husbanding my coal, as the survey could only be carried on under steam, and no coal could be expected short of Vera Cruz. Having arrived at the mouth of the Rio Grande, a party was sent on shore in one of the ship's whale-boats to rate the chronometers and survey the mouth of the river. But in crossing the bar the boat was nearly filled with water, by which a chronometer was ruined for the work of the survey; the boat was also with difficulty saved from capsizing, although to all appearance the bar was passable and safe; after which I hired a covered lighter from shore, in charge of a pilot, for crossing. It is certainly a most dangerous bar, and should never be attempted in a ship's boat, excepting, perhaps, during the months of July and August. We found on it about four feet of water, but were not

able to determine accurately, as it was never smooth enough during our stay. It is half a mile further from shore than it was when last surveyed (in 1857). This fact, and the shoal-water extending for nearly a mile before reaching the deep water of the river, plainly show that the alluvium and débris from the latter are fast extending the land. In fact, quite an extent of shoal marked on the chart of 1857 is now quite dry. We found that the observatory which was erected by the United States Boundary Commission had been carried away a few years since by the changing of the bed of the river, caused by a hurricane, the channel now being over the spot where it stood; and, by-the-way, I will here remark that the river's bed, according to the inhabitants of Clark's Village, on the Texas side, is constantly working to the northward, and Mexico is consequently gaining ground at our expense. I was informed that at the close of the Mexican war the Mexican town of Bagdad was close to the river's bank; now it is fully a quarter of a mile from it. We found little or no tide; but at the ship's anchorage, three miles from shore, there was a current setting generally to the northward and eastward, or parallel to the coast-line; but, like the tides in this vicinity, it is very much influenced by the winds, and varies from a half to a mile and a half per hour. This north-easterly set of the current doubtless continues, and, uniting with the outflow of the Mississippi, goes far towards creating the Gulf stream. Taking a spot near where the observatory stood as our initial point, other points were established from it down the coast as far as the signals could be seen. The ship was then (on the 11th of April) got under way, and the survey carried on by cross and astronomical bearings, and by angles from the ship upon huts, wrecks, logs, etc., the ship's positions being frequently determined by observations. After thirty miles had been run in this way, the ship was anchored, and an attempt made to land and verify the work; but the boats could not reach the shore, owing to the very high line of breakers in which no boat could have remained upright, but the ship was kept at anchor, and her position determined as accurately as possible, and the shore fixed from it. The ship was then got under way, and continued on down the coast, making frequent but unavailing attempts to land, until reaching Tampico River. From the Rio Grande to the Rio Fernando del Tigre it is a dreary waste of sand, raised into small hillocks by the winds, and relieved here and there by small patches of tufted grass. The soundings were quite regular, there being from six to seven fathoms within a mile or less of the shore, and the bottom was covered with coarse gray sand unmixed with

shells; and, as no fish were caught, I am inclined to believe that all is as blank under the water as on the land. There was now and then a norther, but the wind was generally from the eastward and southward and eastward, which brought in a heavy swell, which, breaking violently as it neared the shore, made it a very dangerous coast to approach in bad weather. The climate is very damp, as a general thing, but is dry for a short time after a norther, although it is then cold and disagreeable. After leaving the Rio Fernando, the Laguna del Madre appears in sight, which is a great relief. The lagoon is separated from the sea by a narrow belt of sand in hummocks, broken enough in a number of places by the sea, the most noticeable being the Boquillas Cerradas. The land all along is so low that the lagoon could be plainly seen from the deck of the vessel. We found that the coast was much in error as laid down on the chart; the land extends further to the eastward, from five miles at the Fernando to some fifteen at the Boquillas Cerradas. But I am inclined to think that this error does not altogether arise from incorrect surveys, for it is many years since this part of the coast was surveyed, and the shore has doubtless been extended to the eastward by the sand being thrown up by the constant action of the heavy easterly swell. I noticed that, all along this part of the coast, the sea broke violently at some distance from the shore, as if new ridges of sand were being thrown up, which in time would appear above the surface. After leaving Laguna del Madre, as the River Santander is approached, high land appears some ten miles back from the coast called Corrizo and Palmas. This is the first approach to the mountain-range which extends, with little interruption, all the way to the peaks of Perote and Orizaba. After leaving the Santander the coast rises higher, with principally sand-hills, but with more signs of verdure, until the vicinity of the Rio Tordo is reached, when the coast-line is higher a hundred feet or more, and is well covered with grass or trees immediately back from the coast. The bottom becomes in places rocky and quite uneven, varying from five to nine fathoms a mile or two from shore. Along this region large quantities of excellent fish were caught. The weather was much the same; that is, easterly and south-easterly winds, with hazy weather and heavy swells, which made it difficult to obtain accurate results. There were occasional northers, but of a lighter nature. After leaving the Tordo, the land increases in height on the coast as well as in the interior, and the foliage extends close to the sand-beach, becoming more and more dense as the Tampico River is approached. At Tampico bar, where we

arrived April 29th, a landing was effected, and its position ascertained to be very little different from that given on the chart, which is from an English survey of comparatively late date. On the bar there were found nine feet of water, with a sand islet of small extent just awash. To this point bold water was found all the way from the Rio Grande, with the shore a mile distant. There were no appearances of rocks two miles from the shore, between the rivers Santander and Tordo, as described in the various "Sailing Directions" and "Coast Pilots". If such there were at the time of the old surveys of the Spaniards, the coast has extended out to them, and this is borne out by the fact that we found the coast-line constantly further to the eastward than as laid down on the charts, as was the case further to the northward. After leaving Tampico, the coast-land becomes higher for some forty miles; but it gradually loses its green appearance, until the sand-hills become entirely bare, and continues so until Cape Roxo is reached. The water, also, deepens until twenty-four fathoms are found, the bottom being covered with coarse gray sand mixed with broken shell and gravel. A landing was made at Cape Roxo, the ship being anchored between it and the Blanquilla reef. The weather was very fine and the water smooth; but the boats, on leaving the shore, were filled with water by the surf. The following day, the sea was breaking very violently between the ship and the shore; so that it must be a very unsafe place for a ship in bad weather, particularly as the anchorage is bad, the bottom being covered with rocks, anchors, and chains. A boat was sent to the Blanquilla reef, which was found to be a sand islet, just showing above the water, fringed with coral reefs, bold of approach, four fathoms having been found close to them. After leaving Roxo, the ship was anchored to the southward and westward of Lobos Island, the ship having been taken between the reefs and the main-land, finding not less than five fathoms and quite a smooth sea, thereby showing the passage to be safe for an ordinary vessel in good weather. Lobos Island is oval-shaped, a quarter of a mile long, in a north-east and south-west direction, and covered with trees of considerable height. It affords a good shelter during the northers, which occur so frequently during the winter and early spring months. The island is surrounded by a coral reef, which can be approached boldly, four or five fathoms having been found by us close to it. Twenty-four fathoms were also found between it and the reef (Media) to the northward of it, showing a clear and safe passage for a ship of the largest class. To the southward of Cape Roxo the land becomes densely wooded and higher, and remains so until near

Vera Cruz. The Rio Tanguijo was found to be but some seven miles to the northward of Tuspan, although it is laid down eleven miles further north on the old charts. Tuspan bar has but six feet of water on it, and is rarely passable for boats, excepting during the summer months. Shoal-water extends some two miles out, so that vessels have to be careful in taking an anchorage. The ship was taken between the Tuspan reefs and the coast, and a very safe passage found, there being not less than seven fathoms. The reefs are principally of coral, nearly awash, and covered with turtles. The reefs were quite smooth when surveyed by us, but they must break very heavily in stormy weather. They can be approached closely, and deep passages were found between them. The weather continued much the same, with the exception of the northers, which rarely extend into the month of May. A narrow lagoon commences some thirty miles to the southward of Tuspan, and extends to near Point Delgada, with numerous openings to the sea, including several rivers, the most important of which are the Gonzales, San Pedro, and Palmas. After leaving Tuspan, the mountains become higher and approach the coast, from which they are cut off by the lagoon described above. The Dos Hermanos, some thirty miles to the northward of Point Delgada, and near the Rio Palmas, tower boldly to the height of a thousand feet, and must serve as an excellent landmark to vessels in clear weather. The coast from Tuspan to Delgada was found to be laid down on the old charts from two to three miles too far to the eastward, which was quite accurate when we consider the inadequate means possessed at the time for determining longitudes. The coast from Delgada to Vera Cruz, including the reefs off the latter place, was found to be quite correct, it having been surveyed not many years since by officers of the French navy. From Point Delgada to Point Zempoala, some thirty miles to the northward of Vera Cruz, the mountains rise immediately from the coast from fifteen to twenty-four hundred feet, and are bold and rugged. The water gradually deepens after leaving Tuspan, and is entirely free from danger. The bottom appears covered with gray sand, shell, coral, and gravel. We reached Vera Cruz on the 15th of May, and left there on the 20th of the same month, and returned to the Rio Grande to rerate the chronometers for the final corrections of the survey. We found the bar just as dangerous as when we left, but there were no northers. There is not a harbor along the whole extent of coast until arriving at Vera Cruz for any but small coasting vessels, excepting the River Tampico, the bar of which can be passed at times by vessels drawing ten feet of water.

I was therefore compelled to anchor on the open coast. We arrived off the Rio Grande, on our return, on the 24th of May, having been but some six weeks making the running survey, which will account for the meagre description I have to give of the coast, etc. I have had also to trust to memory, as all the data were sent to the Navy Department.

Very respectfully yours,

F. H. BAKER,

Commander U. S. N.

ALVAN S. SOUTHWORTH, Esq.,

Secretary American Geographical Society.

XL
EXPLORATIONS IN THE ALEUTIAN ISLANDS AND
THEIR VICINITY.

BY WILLIAM H. DALL, OF THE U. S. COAST SURVEY.

COMMUNICATED.

SAN FRANCISCO, Cal., *Dec. 5th*, 1873.

DEAR SIR,— Your letter of November 25th is at hand. In reply to it, I am able to state that the party under my charge, under the direction of the Superintendent of the United States Coast Survey, has been engaged since August, 1871, in reconnoissance work in the Aleutian Islands, with the exception of the winter of 1872-3, which was spent in refitting in San Francisco. The liberality of the Superintendent's instructions has allowed me a certain amount of discretion in the work to be attempted, an elasticity necessary in the very adverse conditions of weather under which we are obliged to carry on the work.

Since the authorization of the explorations, careful observations have been continuously kept up of the meteorology, specific gravity, and temperatures of the sea-water at the surface and at various depths, and observations for the determination of the nature and direction of the oceanic currents of the North Pacific, and of the tides of the Aleutian Islands. Our work in the past season in these particulars has been simply a continuation and confirmation of the observations and results of the seasons of 1871-2. The most important result of these observations has been the determination of the existence, and the rate, dimensions, direction, and temperature, of a recurving branch of the great easterly North Pacific stream which abuts on the coast of North-western America near Dixon's Entrance, and continues trending with the coast in a northerly and then westerly and south-westerly direction south of the islands. No definite current has been shown to exist in the eastern part of Behring Sea. The tides have been determined to be of a compound

and very complex character throughout, the chain rising invariably from the east towards the west, and causing heavy rips and bores in the narrow channels between the islands. The climate is mild and uniform, not so cold as that of Philadelphia, though fogs and rain are very prevalent and sudden, and severe storms are prevalent during the winter and equinoctial periods. The barometer is subject to many and extreme fluctuations; and its relation to the weather, especially in the western islands, is yet but slightly understood. The thermometer rarely descends as low as $+8^{\circ}$ Fahr.; indeed, we have never experienced anything lower than $+11^{\circ}$, and that only once.

The work includes hydrographic, geodetic, and topographical surveys of harbors and their vicinity, reconnoissance-charts of groups of islands, and the determination of magnetics and latitude and time wherever practicable. Such work has been done this season at Attu, Kyska, the Dávidoff Islands, Amchitka, Adakh, Atka, Unalashka, and the Shumagins. A careful survey of the harbor of Kyska was made with reference to the facilities afforded by it as a landing station for the Japan cable, should it be decided to take it that way. Nearly all the other harbors in the islands were examined with reference to the same question, and this appears to furnish all the requirements, and to be the only one which does so. The magnetic variation obtained at many stations differed widely from the old surveys, and it was found that the easterly variation appears to be on the decrease and changing with some rapidity. The island of Amchitka was found to be very erroneously located on the latest charts, as were the Dávidoff Islands and the islands of Four Craters. The celebrated volcanic island of Bogostoff (Ioanna Bogostova, or St. John the Theologian of the Russians and Agashagok of the Aleuts) was found to be much further north than supposed, and the reef supposed to connect it with Uinnak (and delineated on most charts) has no existence. We obtained 800 fathoms and no bottom where it was supposed to be.

A chart of the Shumagins containing eight islands, fourteen anchorages and many dangers, hitherto unrepresented on the chart, was one of the results of the season of 1871-2. This was still further improved during the past season. Five harbors and one strait have been carefully surveyed and sounded, and tolerably accurate sketches made of as many more. The eastern and southern extension of the celebrated Sannakh Reefs (Halibut Island of Cook) were determined. Several new cod-banks offshore have been discovered and located.

Deep-sea soundings have been taken whenever the weather per-

mitted north of the islands, and these entirely change the complexion of the western half of Behring Sea. The shallow plateau of that sea has its south-westerly termination (in 60 fathoms) at the north-westerly end of Unalashka, when it drops down to about 1,000 fathoms very suddenly. The water is very deep, and the bottom rocky and irregular close to and north of the islands west of Unalashka. Our deepest was about 1,100 fathoms, and no bottom at that depth. Recent chalk or Globigerina ooze was found in process of formation in 800 fathoms.

Considering the size of our party, which includes only three officers directly engaged in scientific work, and that our vessel is of less than 100 tons burden, we do not feel that the results hitherto have proved inadequate returns for the expenditures incurred by the government, especially as we get less than one day suitable for surveying work in every three of the season, comprising about five months of the year.

During the leisure enforced by bad weather, collections for the National Museum in archæology and natural history were made with interesting results. This season we obtained thirty-six prehistoric crania from caves, and many hundred bone and stone implements and carvings. The results of the natural-history collections show that the fauna and flora do not exhibit Asiatic influences as we go westward, but become more Arctic and meagre in their character, until, on the westernmost island, they are almost wholly Arctic or Boreal. The collections have great value as exhibiting more thoroughly than any previously made the history of the geographical distribution of life in that region.

Trusting that you may be able to cull from this *résumé* such information as may be of value to the Society and interesting to geographers, I remain,

Very truly yours,

WM. H. DALL,

Actg. Asst. U. S. Coast Survey, in charge Alaska Survey.

ALVAN S. SOUTHWORTH, Esq.,

General Secretary Am. Geographical Society,

Cooper Institute, New York.

XII.

WORK OF THE UNITED STATES HYDROGRAPHIC OFFICE IN 1873.

BY COMMODORE R. H. WYMAN, U. S. N.

COMMUNICATED.

HYDROGRAPHIC OFFICE, BUREAU OF NAVIGATION,
WASHINGTON, *Dec. 6th*, 1873.

MR. A. S. SOUTHWORTH,

American Geographical Society, Cooper Institute, New York.

SIR, — Replying to your note of the 3d inst., I inform you, with pleasure, of the operations of this office during the past year. The usual Hydrographic Notices, and Notices to Mariners, have been prepared as occasion required, and issued; as also the yearly lists of Foreign Lights; Sailing Directions for the Coast of Brazil, Part I.; The Navigation of the Atlantic Ocean, Steam Lanes across the Atlantic, and Routes of Steamers between the English Channel and New York; West Coast of Africa, Part I.; Sailing Directions Red Sea, and third supplement of the Northern and Eastern Gulf Stream, have been compiled and published. Fifty-eight charts have been corrected. Nine new charts are in process of engraving, and 119 have been prepared by the lithographic process. A party has been organized, and the necessary instruments have been prepared, for determining the longitude by the electric telegraph of the West-India Islands, and the points on the northern coast of South America where the telegraph-cable has been laid.

A running survey has been made by Commander Baker, commanding U. S. S. "Wyoming," of the Gulf coast of Mexico from the Rio Grande to Vera Cruz, and material errors discovered in the longitudes of many points on this coast. In the Pacific Ocean a survey has been made by Commander Dewey, commanding the U. S.

ship "Narragansett," of the coast of the Peninsula of California, and the outlying islands, from Cape St. Lucas to San Diego. The U. S. ship "Portsmouth," Commander Kerrett, has been employed searching for dangers and shoals marked as doubtful between the Sandwich Islands and the coast of California. As other duties have permitted, surveys have been made of harbors on the several stations by vessels attached to the several squadrons.

Commander Belknap, U. S. ship "Tuscarora," has been employed with marked success in getting deep-sea soundings in connection with the proposed Pacific cable.

Very respectfully, etc.,

R. H. WYMAN,

Commodore U. S. N., and Hydrographer.

XIII.

EXPLORATIONS AMONG THE RUINS OF PACHACAMÁC. PERU.

BY JOHN SCHUMACHER.

COMMUNICATED.

On the 3d of May, 1878, we left Lima, to visit the ruins of Pachacamác,* distant about five leagues, in a southerly direction. H. B. M.'s General-Consul in Peru, Dr. Hutchinson, procured the necessary horses, and his amiable wife (like her husband, an arduous collector) supplied us richly with eatables and drinkables. Our party consisted of Dr. Hutchinson; Lord Cochrane, a young English officer, and a near relation to the famous Chilian Admiral of the same name; Mr. J. B. Steere, an American naturalist; another young Englishman, whose name I have forgotten; Mr. Silva, justice of the peace, from Lurin; Master George Wilson, son of the English Vice-Consul, a very active and amiable young man; myself, and my second son, Christian, a boy of twelve years. The latter, though a mere child, is, nevertheless, a good hunter and collector, and was a very useful member of the party by his indefatigability and sharpness of sight in ferreting out objects worthy of being collected.

One part of the excursion—from Lima to Chorillos, a fashionable watering-place—was made by sail; the other part, on horseback. The road, after leaving the outskirts of Chorillos, leads through a swamp, abounding in game, fevers, and frequently also in robbers. It is in some places so narrow that the cavalcade could only move in single file. After some hours' ride, the desert, in which Pachacamác lies half buried, slopes down towards this swamp, upon which it is slowly but steadily encroaching. Soon every sign of vegetation disappears; we are swallowed up by the desert.

* The name Pachacamác is composed of two Quichua words, signifying "Creator of the World".

On our way out, we followed the coast-line of the Pacific, the blue waves of which dashed gracefully up the white beach, generally in a playful way, but now and then, in a heavier swell, which came on roaring, breaking with a rolling thunder over the pebbles, and throwing its silvery spray upon and far beyond us. The dark-blue sky of the tropics was reflected from the burnished surface of the "peaceful sea", upon which the glittering rays of the sun were merrily dancing, wrapping everything in an atmosphere of light, cooled by the fanning of the gentle sea-breeze. Some hundreds of light-winged sea-birds united the useful with the beautiful in enjoying the results of their ichthyological studies, and the bracing influence of the morning-air, clear and cool, like crystal; and high above them a solitary eagle drew his wide and threatening circles, and seemed to be doubtful whether to dart upon the shrieking rabble below him, or to begin his poetical flight to the sun. We likewise felt the vivifying influence of nature's beauty, harmoniously combined; and, inhaling eagerly the balmy morning-air, we came to the conclusion that mere breathing could be a delight.

The superiority of mules over horses for such voyages was again demonstrated by Mr. Silva's animal, which, though always going in an easy, shambling pace, and in no way seeming to exert itself, nevertheless frequently forced us to put our horses to a sharp gallop, to be able to keep up with it.

After due time, we arrived at Pachacamác, "The Lone City of the Silent," one of the Karnaks of South America. The only plant growing among its ruins here and there is a Bromeliacea, participating in the ruinous aspect of its habitat. Formerly the country was highly cultivated, and irrigated by many hundreds of water-courses, constructed by order of the Incas, or probably already by the Yuncas, a people who inhabited this region at a pre-Inca time. The Spaniards destroyed all the canals, or allowed them to fall into decay, and doomed the place to its present desolation. Very little is known about the Yuncas. They became tributary to the Inca Pachacutec. Quismanco was then *Hatun apu* (Great Master) of the Yuncas. Their idols were fishes, and the number of nets and paddles found in their graves, combined with their geographical position along the coast of the Pacific, proves that the majority of them were fishermen.

The Incas, unlike the Spaniards in later times, were satisfied to impose their mundane rule, and did not interfere in religious matters. The temple of Pachacamác is said to have been on the slope of a great hill, to the south-west of the town. This does not agree

with Spanish tradition, which places it on the western summit, I am inclined to believe that the Temple of the Sun was on the summit, the ruins of which, situated on three lofty artificial terraces, are still visible. This error of the Spaniards arose probably from the fact that the Incas, too, adored Pachacamác as their greatest but invisible god. They built no temple dedicated to him, whereas the Yuncas had a temple of this god, the remains of which are still visible on the western slope, and will be described hereafter. Hernando Pizarro wanted to take this temple, famous for its great riches in gold and silver ornaments, by surprise, for the sake of completing the ransom for Atahualpa's life; but he did not entirely succeed. The priests, aware of his coming, are said to have hidden 400 loads of gold; and as the men who carried them soon after died (they were probably killed), the traces of these treasures have been lost. However, he succeeded in securing booty which was afterwards estimated at 80,000 castellanos.

Pachacamác is said to have been destroyed under circumstances of revolting cruelties towards the inhabitants and some hundred virgins of the Sun, though Herrera contradicts it in saying, "*Sacaron tambien sus virgenes Mamaconas, porqué no se las violassen.*" After destroying the buildings, in their search for gold, the Spaniards dug up the graves, and rifled their quiet inhabitants of every ornament of intrinsic value. Even the jaws of the mummies were broken open with the despoilers' swords, in search of little pieces of gold and silver which the Indians used to give their departed as a viaticum. These atrocities against the living and the past generations, which the Indians held in the highest veneration, laid the foundation of quiet but deadly hatred against the Spaniards; and this feeling is still a distinguishing feature of the present numerous Indian tribes against every white man in general.

Coming unawares upon a crowd of soldiers and their wives,—all Indians, of course,—my presence stopped their merry chatter, conducted in their musical Quichua. They were sullen and silent, without looking at me, and began their harmless talking again after I had passed to some distance. This feeling they participate with the Araucanians, who address every white man coming to their country with the flattering term of "murderer."

Several writers speak of the gloominess of the Indians; I am inclined to believe that they are only so in the presence of the white people.

The destruction of the buildings and graves has gone on up to the present time, and in consequence of it these extensive ruins

present the disgusting spectacle of destroyed charnel-houses. Even I myself contributed to it, so far as the opening of graves is concerned; but, then, I had at least the consideration to cover the exhumed bones again with sand. The whole ground, far and wide, is strewn with ribs, spines, legs, and is covered with dried flesh and skulls, in every state of preservation. Some are entirely bleached; others, in the lapse of time, overgrown again with lichens, which have died long ago; some bare, others covered with dry flesh and with scalps, fluttering in the wind. Bodies of men, women, and children, of every age, of different races, and buried at different times, lie scattered about, making the air redolent with a sweetish smell peculiar to the "dust of ages"; and inducing, in some instances, the barbarous and somewhat indecent feelings of a degenerated neighborhood to make the relics of the past generations the vehicle of coarse and disgusting sports of the present.

But the impressions received are not all of such a revolting character. I was, for instance, almost touched to see the skull of a young girl which had just been dug up. It was covered with long, flowing hair, and made the same impression of childish innocence and beauty among all the full-grown remnants of her tribe. The smooth bones of her face, her fine teeth, and the general youthful outlines, formed a strong contrast to the ghastly grin of her hoary neighbors, perhaps her relations. So even the grave, after many hundred years, has its distinctions of grim old age and youthful charms. Perhaps the utter absence of any thing but desolation and decay made this impression more striking.

Whether the old Indians mummified the corpses artificially or not has not been decided. There exist different opinions about it; but I think it is more probable that the dryness of the climate, combined with the action of saltpetre, which abounds everywhere, was alone sufficient to produce mummification. At least up to this date no undisputed signs of an artificial embalming have been found. Moreover, corpses of animals do not rot; but if they are not devoured, as in most cases, by the numerous scavenger birds (*Cathartes aura*), they dry up.

Among the bodily remnants of these vanished peoples lie scattered those of their former handicrafts and art. Some of these specimens are rudely fashioned, but others highly finished and in good taste. The forms of these articles, especially those of the pottery, are, in many cases, almost identical with the antiques. I made a large collection of the coverings for the mummies, either of rough or fine cotton weavings, or of vicuna or llama wool. They

are sometimes excellent in pattern and texture, and have often their bright colors. Besides wooden and metal implements, a great variety of simple and glazed* pottery is found, partly empty, partly filled with corn,—among it the famous *Zea rostrata*,—yams, beans, and other vegetable productions. The metal is an alloy of copper and tin, to which they know how to give a remarkable degree of hardness by a method known only to them, and lost with them. Frequently charms are found, consisting of either stones, partly or entirely polished, or shells, still perfect, and such like objects; and in one case I saw the highly polished tail-end of a petrified trilobite, which, I think, served for the same purpose.

Among many other objects which I had the good fortune to collect, I found a flute made of a polished bone, which had four holes on the upper and one on the under side. It made a peculiar impression when my son sounded the first tone upon it, after a silence of several centuries passed in the graves of those who possibly danced in former times to its merry melodies, or conveyed through its agency in quiet moon-light nights the sentiments of their hearts to the objects of their love.† A green stone hollowed out, and a round, black stone-runner were also found, both used for preparing their colors, of which many traces are found on the ruins. Frequently one sees small patches of these colors, in which a thin layer of yellow is discernible on a vermilion ground. I am inclined to think, according to some slight traces here and there observed, that they used to draw ornaments on their houses by removing the upper yellow color, and exposing the vermilion under it, similar to the so-called *schraf-fitto* used in Italy in Bernini's time.

Further I saw bronze knives of a peculiar form, and chisels, in shape like ours; paddles, clubs, wooden and stone idols; a wooden bowl, ornamented with the carved neck and head of a duck for a handle; samples of a variety of cloths; highly finished pottery, and plates with the marks of their former owners, consisting of single, double, and triple straight or curved lines, either painted or impressed with fingers; stone implements admirably wrought; golden, silver, and copper ornaments and idols; slings made for warlike

* Some writers say that no glazed pottery is found there. This is an error; I found many specimens of it.

† Garc de la Vega. "Tuvieron flautas de cuatro o cinco puntos . . . por allas tavian sus cantares . . . los quales por la mayor parte eran de pasiones amorosas . . . de favores ó disfavors de la Dama." *Ibidem*, "They used to play serenades, and by the melody they expressed their sentiments, each of which had its own melody. In this way one can say that they talked through the flute."

purposes, and others for children's toys or practice; a ball of cotton thread, nicely and regularly wound by fingers, withered centuries ago; simple and ornamental distaffs; a woman's comb, consisting of a number of small pieces of flattened thorns of plants, very artificially and curiously bound together, and many other specimens of domestic art, war, and trade. One of the stone implements, a small bowl, not quite finished, allowed me to recognize the way in which they had been made; viz., by drilling many small holes to the necessary depth, and afterwards breaking away the thin partitions. The most remarkable object which I found is a short tobacco-pipe, made of a stag's antler, and bearing signs of use inside the bowl. I think this is the only proof that they smoked tobacco, whereas it is known that they used it as snuff and for medicinal purposes.

I collected likewise the skulls of four different races, some of which bear the marks of fractures healed again, and others those of which their owners died. The place of these fractures and their general appearance tell in most cases how they were inflicted. On an average, they are on the upper portion of the skulls, very irregular, and must have been produced by a blunt instrument, or by stones. Fractures with sharp edges, such as inflicted by cutting instruments, are comparatively scarce; at least, in some hundreds of skulls which came under my observation.

Pachacamác was an old and populous town. Its houses were closely packed together in a space of about two square miles, and the almost inexhaustible number of mummies of its inhabitants are buried inside the town, and even inside the houses, in many layers, one above the other. The greater part of the town was built on a plane between two hills; the one to the south-west was principally devoted to their places of worship; the other, to the north-east, was covered with private houses. Here they are in the best state of preservation, whereas the houses beyond this hill, and those in the plane, consist only of substructures. The streets were narrow and irregular, allowing, in many cases, only the passage of one individual at a time. The building-material consisted of *adobes*, sundried oblong blocks of clay, which show frequently the finger-marks of their makers. They are, in many cases, well preserved, on account of the extreme dryness of the air.

Among the remarkable ruins is one temple (probably the old temple of Pachacamác), which has a complete arch in its substructure. This temple is built in a style resembling the Egyptian. On the back part of it are very interesting niches, which were, to all appearances, in former times decorated with cotton fringes. In

some of the graves, we found on the bodies of female mummies thick twisted cotton fringes, about six inches long, and fixed closely on a string. These were worn by women apparently for decency's sake. In the mouldings over the above-mentioned niches, the impressions of similar fringes are clearly visible. They were evidently pressed into the material before it was dry, and formed an ornament, perhaps for a female idol. In the course of time the fringes disappeared, but left their unmistakable impressions in the *adobes*.

The several coverings of the mummies are too well known to be enumerated here again; but I found one exceptional feature, which was new to me, viz., that the whole mummy was frequently surrounded by a thick layer of cotton. This is kept together by a sack of vegetable fibre, plaited like a coarse net, and tied up by a strong string of the same material. On the top of these sacks are often fixed flat heads, carved in wood. In most cases they are very poorly wrought, but in others they are nicely finished. I saw one with inserted eyes—I think fish-eyes—surrounded by artificial eyelashes, and the back part covered with natural hair, arranged in a perfect chignon style. Another of these wooden faces had a striking likeness to the face of the late Duke of Wellington.

Pachacamác is the skeleton of a town, dotted with the bleached skeletons of its former inhabitants. A deep silence reigns over its horrors; but the full moon, rising gloriously in the serene sky, wipes away, in a fairy-like way, everything shocking, veiling the desolate ruins with its wild and silvery light. The dreamy eye of the observer seems not any more to dwell upon the naked remnants of death and destruction, but upon a dreaming town, with its dreaming inhabitants, soon to awake to life again in the first rays of the rising sun. Time alone, under such favorable meteorological conditions, would have left almost intact this old and populous town; but generation after generation, searching for hidden treasures, has waged a war of destruction against the venerable relics of a highly cultivated people, and has scattered and wantonly destroyed those treasures which science alone can appreciate. Nevertheless, enough, and to spare, remains to fill the scientific observer with admiration of a past civilization, far superior to that of the present inhabitants. It is to be hoped that, one day, a well organized research will be made, and, let me add, perhaps through American enterprise and energy, to lift the veil which still hides so many forgotten generations, of whose existence, manners, customs, history, development, and decay almost nothing is known. A minute

and long enough continued exploration would not alone produce important scientific results, but would repay richly all expenses incurred in its execution, and might even lead to the discoveries of rich silver and gold treasures hidden by the Indians.

If we inquire into the reasons why such a wide field of research was not fully explored long ago, two disadvantages present themselves at once,—the great distance and expense, at least for European explorers, and the dangers connected with the undertaking. A trip to Pachacamac can only be undertaken by a numerous and well-armed party. I made this excursion under exceptional advantages. Dr. Hutchinson had by his influence succeeded in inducing Mr. Silva, the justice of the peace at Lurin, a gentleman feared by the whole lawless tribe of the vicinity, to accompany us, for the sake of protecting the valuable life of Lord Cochrane. This protection extended naturally over the whole party.

Mr. Silva offered us the amiable hospitality of his roof, which a traveller of education seldom misses among the wealthy land-owners in Peru, and made us, not alone comfortable, after the fatiguing labors of the day, on his beautiful *hacienda*, but, what is more, he made us really feel at home. After a profound, dreamless night, we rose with the rising sun, to begin our interesting excavations again, accompanied by four Chinamen, kindly lent to us to do the heavy work of digging.

The contrast between the valley of Lurin and Pachacamac is very striking. A complete desert and a beautiful and highly cultivated district are only separated by a small river, over which a sloping iron suspension-bridge is thrown. This bridge is considered a kind of wonder in a land where engineering is still in its infancy. On the one side of it everything is barren, dead, and desolate; on the other, the cool shade of a beautiful avenue of remarkably tall weeping-willows refreshes the sun-burnt wanderer, and allows his eyes to roam over light-green sugar-cane plantations, contrasting splendidly with the darker shades of the rich foliage of numerous trees. Butterflies, beetles, and tropical birds, decked in gaudy colors, are alive everywhere, and the latter fill the air with their melodious twitter. As among individuals the great contrasts, life and death, touch each other; so also here the superabundance of tropical riches and beauties, on the one side, and, on the other, the utmost desolation and dead stillness which surround "The Lone City of the Silent".

XIV.

THE PREHISTORIC INHABITANTS OF THE MISSISSIPPI VALLEY.

PART 1ST—THE MOUND-BUILDERS.

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COMMUNICATED.

Studies, investigations, and explorations prosecuted for more than twenty-five years have resulted in the opinion, that, long before the postcolumbian colonizations of America, the Mississippi valley was inhabited by two distinct and irreconcilable peoples,—one a self-civilizing, the other a self-barbarizing race,—and that the first, a migration from North-western Europe, arrived upon the north-eastern coast of America, above the latitude of 49°; and that the second, a migration from North-eastern Asia, arrived upon the north-western coast of America, north of the same latitude; and that these two streams of migration met in the Mississippi valley, and there encountered each other in irreconcilable conflict, each fighting for territorial mastery; and that this conflict of adverse races was prosecuted for centuries, and finally resulted, several hundred years before the postcolumbian immigrations, in the expulsion and final destruction of the prehistoric self-civilizing people, leaving the self-barbarizing race in possession of the entire country.

There have been found throughout the Mississippi valley two classes of earthworks which contain evidence of diverse origin, one of which is evidently of recent formation. The other class of structures, of much greater magnitude, found in the same localities, bear evidence of greater antiquity. The former embraces the graves and burial-mounds of the existing Indian race, many of which mounds contain numerous human skeletons in a tolerable state of

preservation. The height of these mounds rarely exceeds four or five feet, and, as a general rule, the number of bodies they originally contained was in proportion to their respective dimensions. American archæologists and the Indians themselves attribute these low and irregular graves or burial-mounds to tribes of Indians, the remnants of which now inhabit the Western frontiers of this country. To the same race are to be assigned, also, the ruins of earth-covered houses on the Missouri, and the rude entrenchments, which rarely attain a height greater than from two and a half to five or six feet, and are found about the sites of old Indian villages. As compared with the numerous and gigantic earthworks of the Mississippi valley, which are attributed by most archæologists to another and extinct race named "the mound-builders", these Indian remains are too insignificant, and in all respects too rude and dissimilar, to be classed with those of the mound-builders, the remains of whose works are numerous in Ohio, Indiana, Illinois, Wisconsin, Minnesota, Missouri, Arkansas, Kentucky, Tennessee, Mississippi, South Carolina, Georgia, Louisiana, Alabama, Florida, Texas, and Western Dakota, and on Rainy River and Mouse River, north of our boundary line, in Manitoba; and these regions are the most fertile, and the best adapted to the wants of settled, industrious populations, on this continent.

The two classes of earthworks referred to are often confounded by local and superficial observers.

The great mounds and other earthworks of the Upper Mississippi valley closely resemble those of prehistoric Europe; and they are more ancient than those in the Lower Mississippi valley, which more resemble the *teocali* of Mexico. The latter indicate an advance on the Mississippi valley mound-building civilization, and show ethnic unity of development proceeding from the north southward.

Almost all the large sepulchral mounds of the Mississippi valley that have been examined contain evidence that each one has been the tomb of a single person,—perhaps a great chief, priest, or warrior,—and that the earth heaped over his remains was evidently brought from a distance. This is an important archæological fact, suggesting Asiatic or European descent.

A sepulchral tumulus of the mound-builders, twenty-two feet high by thirty feet base, was opened near Chillicothe, Ohio, which Squier & Davis ("Ancient Monuments of the Mississippi Valley," page 162) describes as "typical", and they add, "It is clear that the tumulus was raised over a single skeleton."

The mound-builders of the Mississippi valley, as of ancient

Europe and Asia, usually deposited a single body (or later an urn containing its ashes) upon the original surface of the ground or in a cist, and erected the monumental mound over it. The size of the mound was in proportion to the dignity and importance of the honored dead.

"When," says Vambéry,* "a chief of distinction [among the Turcomans of Central Asia], one who has earned the title of *botar* (valiant), perishes, it is the practice to throw up over his grave a *joszka* (large mound). To this every good Turcoman is bound to contribute seven shovelfuls of earth; so that these elevations often have a circumference of sixty feet, and a height from twenty to thirty feet.

"In the great plains these mounds are very conspicuous objects. The Turcoman knows them all, and calls them by their names; that is to say, by the names of those that rest below." (Page 373.) The author says in a note on the same page: "This custom existed among the ancient Huns, and it is in use in Hungary even at the present day."

These ancient sepulchral mounds, found in the Old and in the New World, although made only of earth or partly of rudely wrought stone, are evidences of considerable progress in social organization, with established government, under powerful rulers, long ages before the invention of letters or the fabrication of bronze and iron implements. Before the invention of tools for cutting and fashioning wood and stone, there could not have been any distinct mechanic arts, because there were neither carpenters nor stonemasons, nor, therefore, monuments of workmanship or design superior to the mounds and earthworks of the Mississippi valley, commonly attributed to an extinct race of "mound-builders", who, as we know, did not progress beyond the age of hammered copper. It was not until after the invention of cutting implements that earth-mounds were naturally superseded by more imposing monuments of stone, among which are the great pyramids of Egypt, which sprung from the same conception, design, and purpose as the great earth-mounds; both of which classes of structures may, we believe, be traced to a like ethnic origin, to peoples possessing the genius and aptitudes of progressive civilization, requiring only the possession of mechanical

* "Travels in Central Asia", by Armenius Vambéry. Harper Bros., N. Y., 1865. See also "Voyage autour du Caucase," par Frédéric Dubois de Montporeux, Paris, 1839. The Turcomans are of the Ugrian race, of which the Finns are a branch, the White Huns also. The Ugrians were the last mound-building people in Asia and Europe.

implements for that self-imposed indigenous development whence originate the higher mechanic arts. The unity of labor and the patient endurance necessary to accomplish great and laborious public works have never been found self-imposed or indigenous among the tribes of American Indians who have occupied the sites of the ancient mound-builders. The magnitude, systematic construction, great number, and extensive distribution throughout the Mississippi valley of the works attributed to the mound-builders, which extend from Rainy River, in Manitoba, to the Gulf of Mexico, and from near Lake Huron and Lake Erie and the western Alleghany slope to the Missouri and its tributaries, and from the coast-line of South Carolina to Eastern Texas, afford evidence of a very numerous and homogeneous population, and of their migrations and settlements from the north to the south. These extensive remains of the mound-builders cannot be attributed by any satisfactory evidence or argument to the ancestors of our existing Indian tribes, nor to any people found in this country by the pioneers of the present European populations, unless we can assume as a fact that our race of American Indians had lost all knowledge and practice of these ancient industries, organizations, manners, and customs, and had degenerated from a condition of semi-civilization to one of wandering and savage barbarism, long before the arrival of postcolumbian Europeans. No such example of race-degeneracy (purity of race having been preserved) can be found in the whole history of mankind. To show that our present race of Indians are not the descendants of the mound-builders, it is deemed sufficient to refer to the great mounds originally found upon and near the sites of the cities of St. Louis and Cincinnati; the Grave Creek Mound, 70 feet high and 1,000 feet in circumference at the base; and the mound at Miamisburg, Ohio, 68 feet high and 852 feet in circumference. In Ohio alone, 10,000 mounds and 1,500 earth-walled enclosures have been discovered. Who can believe that any people of the same characteristics as our American Indians were the builders of such a gigantic work as "Monk's Mound", at Cahokia; near St. Louis? This mound had a base of six acres, and a summit platform of five acres, was 90 feet high, and contained 2,000,000 cubic feet of clay. And who can believe that our Indians had constructed the earth embankments in Ohio, at Newark and Portsmouth—the latter from fourteen to sixteen miles in extent? or the graded road at Piqua? or the chain of mound signal-stations in Ohio, for instant telegraphing to great distances? or the fortifications and tumuli in the rich valleys of that State? or the great works near Newark, Circleville, and Chillicothe,

which seem to have been great centres of mound-building populations? or the great works throughout the Southern Mississippi valley States, which show progressive change in structure, and indicate an advance in civilization? Many of these Southern tumuli are formed like the *teocali* of Mexico, commonly attributed to the Toltecs. "The mound-builders," says Jas. D. Baldwin, "had a certain degree of civilization which raised them far above the condition of savages. To make such works possible under any circumstances, there must be settled life, with its accumulations and intelligently organized industry." ("Ancient America," by Jas. D. Baldwin, p. 33. Harper Bros., 1872.)

That the mound-builders were not of our Indian races is evidenced not only by the number and magnitude of their gigantic remains, but also by their geometrical structures, which show very considerable engineering experience and mathematical skill. Their works exhibit regular outlines, squares, octagons, circles and ellipses, executed with precision. Many of their squares are exactly 1,080 feet on each side, showing that they had some exact standard of measurement. No such knowledge or skill as this has been found among any tribe of American Indians.*

That our Indians are descendants of the mound-builders has been a favorite theory of Schoolcraft and some other authors who were themselves connected by marriage with Indian tribes; but they have failed to adduce either fact or argument to recommend this hypothesis. Various other theories have been advanced to account for the origin and ethnological relations of the mound-builders, and will be briefly considered.

The pretended relics and inscriptions which have been supposed to indentify them with the Jews, the Phœnicians, and lettered Scandinavians, like the reported plates inscribed with Hebrew characters; the lettered stone of the Grave Creek Mound, and all other reports of letter-inscribed relics said to have been found in the ancient mounds and earthworks of the Mississippi valley, prove to have been fables or frauds. No evidence of ancient letters of any kind has been found in any of the ancient monuments of the Mississippi valley.

Some archæologists assume that the mound-builders were autochthones,—born of the soil. As we remain without a particle of knowledge or evidence upon which to base this supposed law of human genesis, we may refer it to the category of "unknowables". We must seek the origin of the mound-builders elsewhere.

* See Essay of General Force on this subject. Published in Cincinnati, Ohio.

According to another theory, the mound-builders came from Eastern Asia, and first landed on the North Pacific coast, and thence navigated to the Mississippi valley. Were this the fact, traces of their migration would be found from that direction. Their mounds and earthworks would have been scattered all along the route of their migration; for their advance to the interior of this continent would have been necessarily gradual, and dependent upon their increase of population. The eastward extension of their settlements would have required a long period of time. But west of the tributaries of the Missouri and Mississippi, not a trace of the mound-builders can be found; so that they did not come by way of the Pacific coast.

It is equally evident that their immigration was not by way of the Atlantic coast from any point within the present boundaries of the United States, and thence westward to the Mississippi valley, for there is no trace, no monument, indicating this route of their migrations. Failing to find the track of the mound-builders, from either the west or east, from the Pacific or the Atlantic, at any point within the boundaries of the United States, several authors, and among them Foster, in his recent work on "Prehistoric America," assume as the most plausible theory that they migrated to the Mississippi valley by way of Mexico, and came originally from South America.

It is true that the mounds and other structures, the copper and stone weapons, implements, and ornaments, and other remains found in the earthworks of the Mississippi valley mound-builders, resemble like antiquities found in Peru and Yucatan, and indicate a similar original race and civilization. But a close examination of these respective antiquities shows that the supposed South-American or Yucatan progenitors of the mound-builders had attained a much higher degree of civilization, than had the mound-builders of the Mississippi valley. And although they may have been primarily of the same race, and branches of the same original civilization, their separation must have occurred many centuries before the development of their respective civilizations in America. Their migrations to America must have been at different periods, probably many centuries apart, and by entirely different routes. The Tolteca, if of the same race as the mound-builders of the Mississippi Valley, must have been of a more recent period. They may have been descendants, but could not have been ancestors, of the Mississippi valley mound-builders.

The arts of the more recent antecolumbian civilizers of Peru,

Central America, and Mexico were greatly superior to those of the mound-builders of Mississippi valley. The former had attained the bronze age.

It is an interesting archaeological fact, entitled to a passing notice, that hammered copper ornaments and implements have been discovered in Peru, evidently as might be expected, of much greater antiquity than those of bronze. It is an ascertained fact that the ancient civilizers of South America had attained the age of bronze, and that they perfectly understood the art of alloying tin with copper, and proportions of each metal for all varieties of bronze. This art includes that of smelting and casting metals, and evidences a very high order of primitive civilization. But this was an art our mound-builders did not possess. They were of the period of hammered copper, which, although overlooked by archaeologists, must have been the connecting link between the age of polished stone and that of metal-casting, which no doubt preceded the age of bronze. Of this transition we find many evidences in the antiquities of Asia and Egypt. The sudden change from stone to bronze which we find in Europe was, there is every reason to believe, intrusive, of foreign origin, from Asia or Egypt, and not of gradual or indigenous European development. Such sudden transitions, such leaps in the improvement of economic arts, do not occur in the history of civilization. We may therefore decide that the mound-builders of the Mississippi valley could not have lost the art of casting metals. Although they were unable to find in this country tin, an essential component of bronze, they would have made castings of copper if they had previously acquired the art of casting bronze, — a proof that they had not progressed beyond the age of hammered copper.

Nothing in human society is more enduring than the economic arts of primitive civilizations, which always continue in use until superseded by appliances more useful and convenient. The art of both mining copper and hammering it into implements and ornaments did not, among the prehistoric inhabitants of the Mississippi valley, survive the age of the mound-builders. As they had not the art of smelting or casting metals, we may infer, with scientific certainty, that they did not come from any bronze-working people, and that they were not therefore derived from the bronze age of Peru or Central America or Mexico; nor were they, for this reason, emigrants from any bronze-age people of the Old World.

The prehistoric monuments of Central and Western Asia, Africa,

and Europe, traced along their connecting links with the earliest historic ages, show that the Ugrian, Greek, and Scandinavian races were, in their primitive civilization, mound-builders; and through the successive gradations and contents of their sepulchral tumuli we may trace much of their respective fortunes, and, with some degree of exactness, their ethnic affinities, and the tracks and vicissitudes of their colonizations.

We learn from archæological research that there must have been a much larger population in Asia in prehistoric times than in the present age; and that the progenitors of the historical races of Europe and America had their original seats of empire in Central and Northern Asia and Eastern Europe, whence the weaker and less civilized peoples were crowded and driven to the north-east and north-west by the force and pressure of territorial and tribal wars. To escape being enslaved, they were compelled to seek refuge in the more remote and inhospitable lands of extreme North-western Europe and North-eastern Asia. Driven by ambition, or the pressure behind them, both the earlier and later Northmen must have crossed the Atlantic in search of more prosperous and peaceful homes, as in their more recent antecolumbian migrations they colonized Iceland and "old" Greenland. Wandering and fugitive tribes of Northern and North-eastern Asia were crowded eastward towards our North Pacific coast, by which route, as all evidence seems to indicate, came the progenitors of our Indian tribes.

In this prehistoric pressure and conflict of populations, the stronger races of civilizing tendencies, the great mound-building riparian peoples, may be distinctly traced through their sepulchral mounds from the regions around the Black Sea and Caspian, north-eastward, along the rivers of Russia to Finland, and thence to the Scandinavian peninsula and to the British islands; their course thus far pointing towards the extreme north-western coast of America.

Unable to find a track of the mound-builders leading into the Mississippi valley, from South America or Mexico, from the Pacific or the Atlantic coast, within the boundaries of the United States, and rejecting the unsupported hypothesis of autochthonic origin, we can seek only in the north beyond our international boundary for their footprints and landing-places, and thence trace out their route of migration southward. And we believe their very footprints have been found on Rainy River, in the vicinity of our northern boundary line, where have been discovered a number of artificial mounds, from 30 to 40 feet in height and 100 feet and upwards in

diaméter. They are covered by a forest of large trees, among which are oak, basswood, elm, ash, and balm of Gilead. These remains indicate the presence there, at a very remote period, of a populous mound-building people. The soil of this region is described by competent authorities as "a rich, dark, sandy loam, mixed with much vegetable decay, and with a subsoil of clay". It is such a region as a sedentary riparian people, depending upon agriculture, the chase, and fisheries, would select for their abode. The late Gov. Simpson (Governor of the Hudson Bay Territory), by whom, about twenty years ago, I was first informed in regard to these mounds, expressed the opinion that they could not have been the work of the predecessors of our Indian race. He has published a description of the Rainy River valley, in which he says: "Is it too much for the eye of philanthropy to discern through the vista of futurity this noble stream, connecting as it does the shores of two spacious lakes, with crowded steamboats on its bosom and populous towns on its borders?" Here, then, in this rich valley, do we find the (at least probable) remains of the first peaceful, populous, and flourishing settlement of the Mississippi valley mound-builders, where they long remained. And whence issued their swarming increase, the main branches of which advanced on streams navigable for their boats, first westward by Rainy River, Winnipeg Lake and River, and Red River to the Assiniboine, and southward up Moose River to its southern bend, which approaches near to the north-western bend of the Missouri River, and thence up the Yellowstone River, in a south-westerly direction, and up the Big Horn and other tributaries of the Yellowstone, in a southerly direction. Along this track we trace their footprints, their characteristic monuments; and in these rich valleys we find evidences of their long-continued residence and great population. And here we find extensive fortifications, indicating that in this region the mound-builders encountered their first intrusive and aggressive enemies in great force. Throughout the region between the Missouri and Big Horn rivers, from the Yellowstone southward, approaching to near the Black Hills country, explorers report the ruins of many mound-cities; but of these antiquities, archæologists have had, until recently, very little intimation, this region having been rarely visited by white men.

The Smithsonian Report for 1870 contains "A Sketch of Ancient Earthworks on the Upper Missouri," by A. Barrandt, civil engineer, of Sioux City, made from personal inspection. According to his account, the mound-antiquities of this region are not inferior in

interest and importance to those of Ohio and the Lower Mississippi valley. He discovered that the mound-builder had made settlements along the streams and valleys of the eastern spur of the Rocky Mountains, as far west as the 107th meridian. Mr. Barrandt states that he found up the Yellowstone River, about 140 miles from its mouth, an ancient city of mounds, situated on a bluff of about 180 feet in height. The city seemed to have been regularly laid out, the streets regular, and the mounds equidistant from each other. In the south-east quarter of the city, on the widest of the streets, he describes a mound of "colossal" dimensions, sixty-three feet in diameter at the summit, and twenty-seven feet high. He counted the mounds, and found eighty-seven in a good state of preservation, and sixty-three in ruins. On the outskirts of the city, he found elongated mounds, which he believed were designed and used as fortifications. Besides the ruins of other cities in this region, he mentions a work he saw near Clarke's Creek, Dakota, which was a parallelogram, 340 feet long, 190 feet wide, and 25 feet high (the walls being on an average seven feet thick at the summit), besides other extensive works in the vicinity. At another point, near Moreau River, he found a group of mounds the largest he had ever seen. These remains extend from the Yellowstone River to Bonhomme Island, near the present city of Yankton. They exhibit a progressive change of structure and outline from the most simple to the most complicated.

From other sources of information, we trace the outlying settlements of the mound-builders across to the east side of the Missouri and a short distance up the James and Sioux rivers. In this vicinity we lose their track, but soon find it again on the Lower Missouri and along the Mississippi, where, on the site of the city of St. Louis and in its vicinity, we discover that the mound-builders erected some of their largest works, and must have there become a numerous and prosperous people. From this point, we trace their works through Illinois and Indiana to Ohio, where their remains indicate that they became very powerful.

From their original colony on Rainy River, we trace other tracks of their migrations, proceeding directly southward, down the Mississippi River and some of its upper tributaries, including the St. Croix, along which we find at various points mounds and other earthworks, which indicate their former presence. We trace them southward into the State of Wisconsin, where they must have sojourned a long time, cultivating the richest lands of that State, as

well as those across the lakes in the State of Michigan, where they made settlements. In the former State are effigy-mounds, representing on a large scale animals and men, which baffle the conjectures and investigation of archæologists. As we there find no defensive works, we may infer that the Wisconsin mound-builders voluntarily migrated southward, perhaps to unite with the main body of their race; or it may have been for mutual protection, when hard pressed by powerful enemies, probably tribes of Indians from the north. By overwhelming invasions from the north, they were finally driven from Ohio, the chief seat of their empire and centre of their great power and population, and compelled to fly southward, hotly pursued by conquering enemies, as far as the State of Kentucky, "the bloody ground" of prehistoric traditions. There, reinforced probably by Southern Indians, their natural allies against a common foe, they were enabled to escape the fury of their pursuers. These Southern Indians resembled the Puebla Indians of Mexico. They were a sedentary and industrious people of civilizing tendencies, and would naturally find in the mound-builders congenial allies, with whom they could coöperate and mingle. When first visited by our race, these Indians, as the Natchez and cognate tribes, were a partially civilized people; and from a careful study of their characteristics, manners, and works, as observed when they were first visited by modern Europeans, we may reasonably conjecture that this people had absorbed the mound-builders, among the descendants of whom no pure blood remained to perpetuate their race, and maintain and develop their indigenous civilization. Among the Natchez (now an extinct people) were found distinct footprints of the mound-builders.

Tracing the remains of the mound-builders from Ohio southward through Kentucky, to near the Gulf of Mexico, we observe the gradual diminution, both in size and numbers, of their fortifications. Ancient remains in Kentucky, of what seem to have been their temporary fortifications, indicate that the new northern frontier of the mound-builders, after they had been driven from Ohio, passed through that State. When our Indians were first visited by white men, there was an uninhabited zone of the country passing through Kentucky, which separated the Indians of the North from those of the South. This was then called "*the bloody ground*", where, according to their traditions, there had occurred, a long time before the arrival of our own immigrations, great battles, with terrible slaughter,—the most terrible in the traditions of the red men.

Here were probably the last decisive battles, in which the retreating mound-builders, reinforced by Southern tribes, drove back the Northern Indians, who never after crossed this "bloody ground", until the ancient tribal boundaries had been changed by the influence and pressure of postcolumbian colonizations.

To find where, on Lake Superior, the mound-builders must have first mined for copper, by what route they probably came to America, and whence they came, we return to their original colony on Rainy River, where we find that they were on the boat-route of the Hudson Bay Company,—a chain of navigable waters, interrupted only by occasional easy portages, from the Atlantic coast of Labrador, and from James Bay to the Red River of the North (this whole route being north of the international boundary-line), and from Lake Superior by way of Pigeon River to Red River.

Near the mouth of the Pigeon River is Isle Royal, the great copper-bearing island of Lake Superior, where the mound-builders of Rainy River were, it may be reasonably conjectured, the first copper-miners of this region. On Isle Royal, Prof. Whitlesey (see his paper in the Smithsonian collection) found the most extensive known ancient copper-mining excavations, which he attributes to the mound-builders. These excavations covered a surface so large, that the labor on them must have required a very long time and a very large force of workers. Isle Royal is but a short distance from the north shore of Lake Superior and the mouth of the Pigeon River. From these facts, we may certainly infer that these ancient miners came first from the northern side of the lake, and, most probably, from their settlements on Rainy River, if not from more eastern or more northern sites yet to be discovered. For the lack of information in regard to the remains of the mound-builders in the Hudson Bay country, and the navigable boat-routes from the north-eastern coast of Labrador to the Red River of the North and Lake Superior, the attention of students of American archaeology has not been turned in that direction to search for prehistoric migrations from Europe. It has been very difficult to obtain information about the Hudson Bay region, as the Hudson Bay Company, which established their first trading-posts at the head of James Bay, desiring to keep a close monopoly of their profitable trade, kept the outside world, as far as possible, ignorant of the geography and resources of that country. In that region, a settled or migratory people would easily obtain abundant subsistence. From the coast of Labrador to the Red River of the North there are many navigable rivers and lakes, abounding

in fish, and the country is well supplied with game, and for vegetation is superior to Northern Scandinavia or the Orkney Islands.

From the Lower St. Lawrence River, the Gulf of St. Lawrence, coast of Labrador, and Hudson Strait, there are several sufficiently direct boat-routes by which the mound-builders could have made voyages to the sites of their settlements on Rainy and Red rivers. Upon these routes the Hudson Bay Company have long transported goods in boats, carrying from eight to ten tons each. This whole country needs more archaeological exploration to determine, beyond all question, the route by which the mound-builders came into the Mississippi valley.

My own studies tend to the conclusion that the mound-builders were of the Finnish race, driven by invaders from place to place; that they migrated by stages from Western Scandinavia to Northern Iceland, Northern Scotland, the Orkney and Shetland Isles, and next, by way of Iceland and Greenland, crossed over into Hudson Strait, and found a place of refuge in America. They could have landed in Ungava Bay of Hudson Straits, and thence, by one of several river routes, proceeded *via* James Bay and the English River route to Rainy and Red rivers, where we find many tumuli as the evidence of their former settlements. From James' Bay, they could have reached Lake Superior by a direct and short route *via* Moose and Michipicotan rivers, a route formerly much used for transportation by the Hudson Bay Company. To present as fully as the subject merits, the arguments, facts and authorities in my possession to sustain this hypothesis would occupy too much space in this paper. I can only present quite briefly a few points for the consideration of those interested in this subject. Ethnological and archaeological research result in the conclusion that Scandinavia was the land of colonization and migration of successive races, originally driven northward from Asia, and entering Europe by various routes from the Caspian and the Euxine, thereby avoiding conflict with the Phœnicians, Greeks, and Romans, and the barriers to their migrations in that direction. In this pressure of populations on the shores of the Baltic, we discover there first the Lapps, the most ancient inhabitants of which we have any information.

The Lapps, classed with the Ugrian race, are confounded by some ethnologists (as in the "Ethnological Tableau" of Nott & Gliddon, in their "Indigenous Races of the Earth") with the Finns, and represented as of the Finnish type, causing mistakes of identity, like those which occur in this country in describing the intrusive Indian crania found near the surface of American tumuli as the

crania of the original mound-builders. "Ugrian" is the name for the class that contains the Finn and its allied languages, and the men that speak such languages (Latham's "Native Races of the Russian Empire," p. 6), embracing races of quite diverse ethnological characteristics; as, for example, the Magyars, Lapps, Samoyedse, Permians, and many other distinct peoples. The Ugrians, originally occupying the same or proximate regions of Asia and Europe, were early forced generally northward by the pressure of more powerful populations, and are no more to be considered a homogeneous race than are the many alien races of America, which future historians may perhaps class under the general name of Americans. Yet they had much in common. The Ugrians were generally mound-builders, among whom the different branches of the Finns, who settled around the Baltic, were the most numerous and powerful. At the present time Finland contains about a million and a half of pure Finns, until recently serfs of the Russians.

The Finns of the Scandinavian peninsula, and of Denmark, who preserved their freedom have been so generally mixed by intermarriage with the Scandinavians, that only about 9,000 in Sweden and Norway remain to preserve their original characteristics. Sufficient data have been collected for reasonable certainty to show that the Lapps were the occupants of the regions around the Baltic when the Finns arrived there; that Teutonic and Celtic immigrations succeeded those of the Finns; that most of the Celts migrated from thence to the British isles and the regions of South-western Europe, that the Slavic and later Teutonic races were the next invaders of the Baltic regions; that the surviving Finns east of the Baltic and Gulf of Bothnia were conquered and enslaved, and were until the recent emancipation Russian serfs; that the more warlike Finns, after the early invasion, fled over into the Scandinavian peninsula, where they were pursued by the Teutonic invaders, by whom they were driven towards the inhospitable regions of the North Cape, and into the dense forests and strongholds of the mountains between Norway and Sweden, whence for centuries they made predatory incursions against their Teutonic enemies, by way of the sea-coast and rivers, in boats made of willow wicker-work, and covered with hides,—a kind of craft peculiar to the Finns, both light and seaworthy, and easily carried over portages. These wars between the people of Odin and the Finns are celebrated in the traditions and sagas of the Scandinavians. A people capable of so long-continued resistance to such powerful enemies, practised as were the Finns in river

